AMERICAN JOURNAL OF OPHTHALMOLOGY

VOLUME 22 AUGUST, 1939 NUMBER 8

THE USE OF SULFANILAMIDE COMPOUNDS IN OPHTHALMOLOGY*

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The addition of sulfanilamide compounds to chemotherapy is probably the greatest advance in medicine for many years. These drugs have already been tried in the treatment of many inflammatory ocular diseases. In ophthalmology, they have proved especially effective in the treatment of gonococcal conjunctivitis and trachoma. The purpose of this paper is to review the present status of this relatively new form of chemotherapy and to add to the already existing reports a digest of its use in ophthalmology.

PRESENT STATUS IN GENERAL MEDICINE

During the past four years more than 1,000 sulfanilamide compounds have been prepared. Two of these compounds, sulfanilamide and sulfapyridine, produce the full therapeutic effects attainable by the use of all other preparations of this group. Only a very few of the other preparations are worthy of mention.

SULFANILAMIDE

Although it was not the first to be studied, sulfanilamide[1, 2, 3, 4] (p-aminobenzenesulfonamide), produced under the names "Prontylin," "Septoplix," "1162 F," "Prontosil album," and others, is the parent stem from which all the other compounds in this group are derived.

Sulfanilamide is a white crystalline substance, soluble to approximately 0.8 percent in water or normal saline solution at body temperature. It is readily and completely absorbed when given by mouth and reaches its maximum concentration in the blood[5] approximately four hours after ingestion. The blood concentration then diminishes rapidly and reaches zero within about 24 hours after the administration of a single dose. A relatively small, but quite variable, proportion of the drug is converted within the body into acetylsulfanilamide. This compound behaves in essentially the same way as does sulfanilamide except that it is inactive against infectious agents. The "total" concentration of sulfanilamide is the concentration of the "free" or unchanged form plus the "acetylated" form. The proportion which is acetylated after oral ingestion varies widely in different animals, being rather high in guinea pigs and rabbits, lower in mice and humans (averaging around 15 percent in the latter), and zero in dogs. Sulfanilamide is one of the most diffusible substances known. It attains a concentration in the spinal fluid, ascitic fluid, exudates, and the aqueous[6] closely paralleling that in the blood. Excretion of sulfanilamide takes place principally through the kidneys, and varies almost directly with the excretion of water. If the urinary function is seriously impaired, repeated doses will cause a cumulative rise in the blood concentration.

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Sulfanilamide may be administered parenterally in concentrated solution with no ill effects. It should be dissolved in normal saline solution or, better still, in one-sixth molar sodium-lactate solution. Oral administration is preferable, but the subcutaneous route may be used.

The chemotherapeutic effect of sulfanilamide is now generally believed to be due solely to its bacteriostatic effect on certain infectious agents without depression or other alteration of the normal immune reactions of the body against the infection. The mode of action of sulfanilamide appears to be essentially the same *in vivo* and *in vitro*. When a growth of susceptible bacteria is subjected to sulfanilamide in an effective concentration, the bacteria multiply normally during the first several hours. The bacterial growth is thereafter greatly slowed down, although the organisms remain viable and capable of normal growth if removed from the sulfanilamide. An extremely high concentration of sulfanilamide, beyond that attainable *in vivo*, is necessary to produce any bactericidal effect. Sulfanilamide has no effect upon the toxin-producing capacity or virulence of organisms, nor does it produce an alteration of the strain. Several investigators have reported that sulfanilamide produces a change in the capsules of streptococci (and sulfapyridine in the capsules of pneumococci), but this effect has been disputed by many others.[4] The clinical outcome of an infection susceptible to sulfanilamide depends upon the ability of the immune forces of the body to overcome the infection after it has been slowed down by the use of the drug.

With proper precautions, a blood-sulfanilamide concentration of approximately 10 mg. percent (1:10,000) may be maintained in humans with comparative safety for a considerable number of days. This concentration is effective against all the infections that can be treated with clinical success. A higher concentration has no greater effect, and is more dangerous to the patient. In many infections, a lower concentration is equally effective. An approximate blood-sulfanilamide concentration may be reached and maintained by the oral administration of a given dosage on the basis of body weight, provided the renal function is normal. If the fluids are limited to 3,000 c.c., the ingestion of 0.07 gm. per kg. body weight will usually produce a blood level of 10 to 15 mg. percent within about four hours in the adult. This level can be maintained with 0.10 gm. per kg. per day, divided into six doses given at 4-hour intervals. In children, proportionately more is required because of the proportionately greater fluid intake. About twice the above dosage per kg. is required in babies. This scheme of dosage is desirable for severe infections that require prompt and maximum treatment. Approximately three fourths of the maintenance dosage listed above will produce and maintain a blood concentration of from 5 to 10 mg. percent within one or two days. This is quite adequate for those infections in which speed is not of prime importance.

Sulfanilamide in a concentration of 10 mg. percent is quite effective against infections caused by most of the aerobic streptococci[3] (but not by most of the anaerobic group), by meningococci,[7] gonococci,[8, 9, 10] and by B. welchii.[4] It is probably effective, at least to some degree, against those due to Br. melitensis and abortus,[11] B. Friedlander,[1] H. influenzae,[3] and to actinomycosis.[12] There is rather good clinical evidence of its effectiveness against lymphogranuloma inguinale,[13, 14] supposedly a virus disease. Evidence of its effectiveness against the virus of canine distemper[15, 16] is not convincing. It is very slightly active against

most strains of pneumococci,[4] but has little clinical value in these infections. Concentrations of 10 mg. percent are inactive *in vitro* against staphylococci and the gram-negative typhoid, paratyphoid, and enteric group of organisms,[3] although some clinical reports suggest activity against these organisms.[1] It radically alters the course of experimental tuberculosis in guinea pigs,[17] but appears to be ineffectual clinically. A few unconvincing successes have been claimed in the treatment of bubonic plague and malaria.[1] It is ineffective in pertussis and rheumatic fever.[1] It is inactive against any of the neurotropic and respiratory groups of viruses, although it may favorably influence the secondary infections commonly associated with them.[1]

Sulfanilamide appears in the urine in much higher concentrations than can be attained in the blood. It is effective against urinary-tract infections due to staphylococci, B. coli, B. aerogenes, and to Proteus.[4]

The excretion of sulfanilamide by the kidney is accompanied by loss of fixed base. Approximately half as much sodium bicarbonate as sulfanilamide should therefore be administered as prophylaxis against acidosis. Some degree of cyanosis develops in almost all patients given large amounts of sulfanilamide. This is due in part to the formation of methemoglobin, but is probably mainly due to the production of an as yet unknown pigment.[18] This cyanosis will promptly disappear with the administration of about 10 c.c. of 1-percent methylene blue intravenously, but it may be safely disregarded. Dizziness, anorexia, nausea, vomiting, and mild, slowly developing hemolytic anemia are quite common. These form no indication against continuing sulfanilamide. An unexplained abrupt rise in temperature or leucocyte count, especially during the first week, form an important indication for stopping sulfanilamide. These signs are often rapidly followed by acute hemolytic anemia,[19, 20] severe dermatitis,[21] or both. Fortunately these reactions occur in less than 10 percent of patients receiving large doses of the drug.[4] There is very little danger from them if the drug be promptly stopped, fluids forced, and transfusions utilized when necessary. Patients exhibiting these reactions will probably have a recurrence if the drug is started again. Very rarely, agranulocytosis develops, usually after a prolonged period of treatment. Some of these patients die, but the majority survive. One case of toxic hepatitis[10] and one case of retrobulbar neuritis[22] have been reported. On the whole, sulfanilamide is a relatively safe chemotherapeutic drug.

SULFAPYRIDINE

Sulfapyridine (2- (p-aminobenzenesulfonamide) pyridine), "M & B. 693," was first introduced[23] on May 28, 1938. It is a white crystalline compound, soluble in water only to about 1:1000. It is absorbed quite irregularly from the intestinal tract. The same oral dosage may produce a blood concentration of from 1 to 18 mg. percent in different individuals.[24] The degree of acetylation in the human body appears to be slightly greater and more variable than is the case with sulfanilamide. This drug was at first reported to be less toxic than sulfanilamide, but it has now been shown that, on the basis of blood concentrations, it is slightly more toxic.[25] The toxic effects are essentially the same in character as those of sulfanilamide,[12, 26] except that acidosis is not produced. The administration of sodium bicarbonate is therefore unnecessary. The soluble sodium salt of sulfapyridine has very recently been prepared. It has a pH of 10.4 in 1-percent solution, and is hence somewhat irritating.

Sulfapyridine possesses the characteristic of being quite effective, both experimentally and clinically, against pneumococcus infections.[23, 24, 27] It has also come into increasing usage in the treatment of gonorrhea.[28, 29, 30] The statistics at present available indicate that it is probably more effective in the treatment of gonorrhea than is sulfanilamide. Several clinical reports of its successful use in generalized staphylococcal infections have appeared,[31, 32, 33] but they are not entirely convincing. Experimentally, its action against this group of organisms is rather slight. It has also been successfully used in most of the other infections susceptible to sulfanilamide. Sulfapyridine is usually given in dosage roughly equivalent to that of sulfanilamide. The sodium salt can be injected intravenously very slowly in 5-percent solution[34] or given by rectum in 2-percent solution.[24]

PRONTOSIL AND NEOPRONTOSIL

The prontosils consist of a group of related compounds going under the same name. Certain of these compounds are readily soluble. All consist of a sulfanilamide radical joined to an azo radical, which usually imparts a red color to the compounds. These compounds have no bacteriostatic action *in vitro*. Within the body they are broken down with the liberation of the sulfanilamide radical, which is the principal active chemotherapeutic agent. Unfortunately, sulfanilamide has sometimes been called "Prontosil album." This has led to some confusion in the literature.

ULIRON

Uliron (di-methyl-di-sulfanilamide) is the most widely used drug in Germany for the treatment of gonorrhea. It possesses no advantages over sulfanilamide or sulfapyridine, but possesses the disadvantage of often causing a severe peripheral neuritis.

SEPTASINE

Septasine (benzylaminobenzensulfamid) has been used extensively in France and to some extent in England for streptococcus infections. It possesses no advantages over sulfanilamide, and does not have so wide a range of effectiveness.

REVIEW OF OPHTHALMIC LITERATURE

The first reports of sulfanilamide compounds in connection with ophthalmology appeared in August, 1937, when Hageman[35] and Heineman[36] each reported a case of gonococcal conjunctivitis treated successfully with sulfanilamide. Thirteen subsequent reports of the use of sulfanilamide compounds in gonococcal conjunctivitis have appeared in the literature. A summary of the results obtained by each author is given in chart 1.

A total of 104 cases of gonococcal conjunctivitis treated with sulfanilamide compounds has been reported. The results have been uniformly dramatic, except in those patients treated with very small doses of uliron. A marked effect on the course of this disease is exerted by very small doses of sulfanilamide, but the results are more satisfactory when larger doses (maintaining a blood concentration of 5 to 10 mg. percent) are used. If adequate chemotherapy be given, almost all patients can be expected to exhibit a clinical and bacteriological cure within one to four days. Sulfanilamide should be continued for some time after the first negative smear, in order to prevent recurrences (approximately 10 days is probably adequate). Almost no complications or recurrences should take place. Local irrigations may be of value until the discharge ceases, but no other

CHART 1

RESULTS OF TREATMENT OF GONOCOCCAL CONJUNCTIVITIS WITH SULFANILAMIDE COMPOUNDS

Author	Number of Cases	Drug Used	Average Expected* Blood Level	Remarks	Results of Chemotherapy
Hageman[35]	1	Sulfanilamide	Dosage not stated	Details not given	Negative smear within 36 hours
Heineman[36]	1	Sulfanilamide	Dosage not stated	Details not given	Rapid cure
Newman[37]	8	Sulfanilamide	5 mg. %	Usual local treatments. Progress unsatisfactory in all before starting sulfanilamide	Remarkable improvement within one day. Negative smears in all within 6 days
Thayer[38]	5	Sulfanilamide	7 mg. %**	Saline or boric irrigations locally	Rapid improvement in all within 36 hours. Negative smears and cultures after this time
Dollfus et al[39]	3 3	Sulfanilamide Di-(p-acetyl-aminophenyl) sulfone	3 mg. %	Usual local treatments	Marked improvement in all within 2 days. One recurrence after 11-day course of treatment. Satisfactory response to a second course
Magitot et al[40]	5	Sulfanilamide	5 mg. %	No local treatments	3 cases clinically cured, with negative smears, within 3 days. 1 case markedly improved when drug was stopped after 2 days. 1 recurrence after stopping drug. Satisfactory response to a second course
Pages et al[41]	3	Sulfanilamide	6 mg. %	Protargol locally twice daily	Negative smears in all within 4 days
Sourdille[42]	1	Di-(p-acetyl-aminophenyl) sulfone	5 mg. %		Negative smear within 5 days
Slobozianu[43]	5	Uliron	Very small dosage	Irrigations and silver preparations locally	2 cases cured within 5 days. 3 cases cured within 7 to 18 days
Dik[44]	23	Uliron	Very small dosage	Details not given	Many reacted favorably. Some failures
Fernandez and Fernandez[45]	8	Sulfanilamide	2 mg. %	All cases unilateral. Usual local treatments in all except 2 cases	Clinical cures in all within several days, but positive smears or cultures for an average of about 10 days. One recurrence after 3 day course of treatment. Satisfactory response to a second course
Michie and Webster[46]	2	Sulfapyridine	4 mg. %	Usual local treatments. Progress unsatisfactory before starting sulfapyridine	Negative smears within 2 and 4 days. (Compared with an average of 49 days for 10 control cases)
Michels[47]	15	Sulfanilamide	2 to 5 mg. %**	Usual local treatments	Hospitalized an average of only 5.8 days. (Compared with 28.5 days for a control series of 32 cases)
Glover[48]	2	Sulfanilamide	2 mg. %	"Prontosil" locally every ½ hour	Negative smears within 3 and 4 days
Bower and Frank[49]	21	Sulfanilamide	6 mg. % in adults 3 mg. % in infants	Dosage reduced to ½ within 3 days. Usual local treatments	Negative smears in 18 cases within an average of 2 days. Recurrences in 2 infants after 7-day courses of treatment. Only one responded to a second course. Relapse in 1 infant with reduction of dosage after 3 days treatment

* These approximate values are calculated from dosages of the drug given by mouth.
** Blood sulfanilamide levels were actually determined.

local treatment appears to be necessary. The relative value of the various sulfanilamide derivatives remains to be proved.

The use of sulfanilamide compounds in trachoma was first reported by Heineman[36] in August, 1937. He treated one case of trachoma with "Septasine" and two others with sulfanilamide. He stated that the results were so brilliant that they reminded him of the first chemotherapeutic results obtained with salvarsan and with emetine. Five large series of

trachoma patients treated with sulfanilamide have subsequently been reported. The results obtained by each author are summarized in chart 2.

In all, about 250 cases of trachoma treated with sulfanilamide have been reported. The results have been uniformly excellent. It is probably necessary to maintain a blood level of at least 3 mg. percent for about three weeks in order to obtain optimum results, especially with regard to the disappearance of follicles.

CHART 2

RESULTS OF TREATMENT OF TRACHOMA WITH SULFANILAMIDE

Author	No. of Cases	Average Expected Blood Level*	Average Duration of Treatment	Results	Remarks
Lian[50]	30	1 mg. %	14 days	Remarkable clearing of conjunctival inflammation, conjunctival thickening, and corneal complications (except for scarring). Very little effect on follicles. Prevention of recurrences	Advised mechanical treatment for follicles
Loe[51] Gradle**	140 41	3 to 4 mg. %	24 days	Subjective improvement within 24 hours. Paling of conjunctiva within several days. Considerable clearing of pannus after 8 to 15 days. Gradual flattening of granules and follicles after a variable period. No effect on old corneal scars	All stages of trachoma. No other treatment necessary
Dik[44]	Not stated	1 mg. %	Not stated	Similar to those of Lian	
Hirschfelder[52]	25	3 to 4 mg. %	14 days	Similar to those of Loe except that no benefit was observed in very early follicular cases (which the author called border-line cases of follicular conjunctivitis)	

* These approximate blood sulfanilamide levels are calculated from dosages given by mouth.
** These cases were reported in a discussion of Loe's paper.

For purposes of comparison, results of the treatment of trachoma by intravenous tartar emetic may be mentioned. Derkac[53] in September, 1937, first reported 50 cases treated in this way, and Julianelle[54] the following year reported 40 more cases. Intravenous tarter emetic proved quite beneficial, especially with regard to resorption of corneal infiltrates, disappearance of pannus, and diminution of papillary hypertrophy. Derkac found the use of additional local therapy quite beneficial. Julianelle found grattage a necessary adjunct in cases with follicular hyperplasia. This form of therapy is a distinct advance over older types of treatment. However, its effects appear to be neither so rapid nor so extensive as those observed with the use of sulfanilamide.

Thygeson[55] has reported a case of inclusion conjunctivitis in a 34-year-old female treated with sulfanilamide. Dosage of 2 gm. per day was given for 21 days. Inclusion bodies disappeared after the second day of treatment, and a clinical cure was obtained within 13 days. There was no recurrence after two months.

Kleefeld[56] reported 25 cases of dendritic keratitis treated with "Prontosil." Widely varying dosage was used. He thought there was a definite beneficial effect, but his results are not conclusive.

Lamers[57] reported seven cases of herpes zoster (no eye lesions mentioned) treated with small doses of prontosil internally and a Prontosil solution locally. Almost complete cures resulted in all cases within two to four days. This report is not entirely convincing, but bears further consideration.

Harry[58] reported four cases of "panophthalmitis" treated with very small doses of sulfanilamide. An actual pan-

ophthalmitis probably did not exist in two of these patients. In the other two, a purulent condition was undoubtedly present, but these resulted in phthisis bulbi. Butler[59] reported a case of subacute endophthalmitis which gradually developed about one month after cataract extraction. Sulfanilamide was administered in very small dosage (1.2 gm. per day). The ocular inflammation slowly subsided.

Goldenburg[60] reported a case of probable cavernous sinus thrombosis which recovered with prontosil therapy.

Thiers[61] reported a case of "gonorrheal" iritis which was treated with relatively small doses of a sulfanilamide derivative for 17 days. The patient had had three previous attacks. Improvement began on the second day of chemotherapy, and there were no recurrences during the next six months.

Heinz[62] reported a case of endophthalmitis following cataract extraction. The eye improved following the subconjunctival injection of 0.75 c.c. of prontosil solution three times during the course of a week.

Glover[48] reported a group of cases with various ocular inflammations treated mainly by local instillations of prontosil solution. The results sound quite good. However, it must be remembered that the prontosils are inactive against infectious agents until they are broken down, somewhere within the body, with the liberation of sulfanilamide. This theoretical objection cannot be applied to the local use of sulfanilamide solution itself. The local use of sulfanilamide solution has considerable potential value if it be administered sufficiently often to maintain an adequate concentration at the site of infection. Rambo[16] has shown that a concentrated solution of sulfanilamide produces no irritation when it is dropped into the conjunctival sac or is injected into the anterior chamber, and produces only slight irritation when it is injected into the vitreous. He also demonstrated that injection of sulfanilamide into the anterior chamber of rabbits is effective in preventing infection of the anterior segment of the eye by streptococci. The local use of sulfanilamide does not appear to be necessary in the treatment of those infections susceptible to enteral therapy. However, it may prove of considerable value in the treatment of infections that are susceptible only to higher concentrations of sulfanilamide than can be attained by internal administration, such as those due to staphylococci.

Bucy[22] observed a 16-year-old patient who, on two occasions, developed certain toxic reactions soon after starting on a course of sulfanilamide. After a third test dose of only 0.3 gm., she developed a severe optic neuritis which disappeared within three days. This is the only toxic ocular manifestation of the sulfanilamide compounds yet reported.

Report of cases

During the past two-and-one-half years 43 patients have been given sulfanilamide compounds in the Johns Hopkins Hospital because of ocular inflammations. Most of these patients were hospitalized during all or part of the treatment. The drug was usually given in divided doses every four to six hours. All of those patients receiving sulfanilamide also received from a half to an equal dosage of sodium bicarbonate. The hemoglobin was determined every one to two days and the red and white blood counts every two to four days. The temperature was taken every 4 hours, and the carbon-dioxide combining power of the blood was estimated at varying intervals. Blood-sulfanilamide levels were determined, in all but a few

CHART 3

CASES OF "GONOCOCCAL" UVEITIS TREATED WITH SULFANILAMIDE

Case Number	Age years	Number of Previous Attacks	Day of Attack on which Therapy Began	Days of Sulfanilamide Therapy	Average Blood Level	Course of Uveitis after Beginning Sulfanilamide	Duration of Observation after this Therapy Ended	Number of Subsequent Attacks
1	51	1	25	20	8 mg. %	Began to rapidly subside after 10 days of therapy	13 months	1
2	42	6	5	24	5 mg. %	Began to slowly subisde after 10 days of therapy	14 months	1
3	47	4	10	34	4 mg. %	Began to subside rapidly after 2 days of therapy	2 months*	1
4	33	9	10	35	7 mg. %	Already subsiding when therapy was begun. Continued to subside slowly	1 month	0
5	22	0	10	4	6 mg. %	Began to subside the day therapy was begun	19 months	0
6	32	0	35	8	4 mg. %	Already subsiding when therapy was begun. Continued to subside slowly	13 months	1
7	47	4	4	10	5 mg. %	Began to subside slowly after 7 days of therapy	19 months	1
8	54	0	120	7	8 mg. %	Continued unabated during the period of treatment	2 weeks	0
9	36	0	21	8	5 mg. %	Already subsiding when therapy was begun. Continued to subside slowly	None*	0
10	54	1	7	6	5 mg. %	Already rapidly subsiding when therapy was begun. Continued to subside	21 months	0
11	33	1	14	11	6 mg. %	Began to subside before therapy was begun. Continued to subside	12 months	2
12	41	1	72	49	10 mg. %	Gradually subsided during this course of therapy	1 month	1
13	46	many	indefinite	7	4 mg. %	Continued unabated during the period of treatment	16 months	0
14	64	many	indefinite	7	7 mg. %	Subsided soon after beginning therapy	12 months	1

* Patient treated more than one year ago, but disappeared from observation.

cases, every one to four days. Ten of these 43 patients developed toxic reactions of sufficient severity to warrant withdrawal of the drug, but no reaction was observed that did not subside satisfactorily after discontinuance of the drug.

GONOCOCCAL UVEITIS

Fourteen cases of probable gonococcal uveitis were treated. The diagnosis of gonococcal uveitis is always subject to some question,[63] for, as far as can be ascertained, the gonococcus has never been cultured from an eye with a simple uveitis. The diagnosis of these cases must therefore be based on a history of gonorrhea, a positive blood gonococcus complement-fixation reaction, the exclusion of other foci of infection, and the clinical appearance of the uveitis. The onset of inflammation in these cases was usually abrupt and acute. In all except one case, the inflammation was limited to the anterior part of the uveal tract and was usually characterized by massive exudation of fibrin into the anterior chamber and by very fine cellular precipitates on the back of the cornea. A summary of each of these cases is given in chart 3.

An accurate estimate of the value of any form of therapy in the treatment of

uveitis can be made only by statistical analysis of a large number of adequately controlled cases. However, certain inferences of negative value may be obtained from these 14 cases. Primarily, improvement of the uveitis under sulfanilamide therapy did not begin at any regular interval after institution of the chemotherapy, and there was no improvement which could not have been reasonably expected without the use of sulfanilamide. The duration of the inflammation was not less, in general, than the duration of other attacks in which the patient was not treated with sulfanilamide. In the second place, out of the eight patients who had a history of previous attacks of uveitis, and who were treated with sulfanilamide more than one year ago, recurrences have already taken place in six, and one other had an active uveitis when last seen. From these facts one may infer that sulfanilamide is not of significant value in gonococcal uveitis, either from the viewpoints of immediate therapy or the prevention of recurrences.

During the past three years six patients with similar cases of uveitis have been treated with induced hyperpyrexia (including three reported above who also received sulfanilamide). In five of these the result was dramatic, the uveitis subsiding entirely almost overnight. All of these patients had had previous attacks, and out of the five treated more than one year ago there have been recurrences in only two.

OCULAR TUBERCULOSIS

Five cases of bilateral ocular tuberculosis are included in this series. The diagnosis was based on history, clinical appearance, cutaneous hypersensitivity to tuberculin, and exclusion of other foci of infection.[64] All of the patients had lesions quite typical of tuberculous ocular disease. A summary of these cases is given in chart 4.

In two of these five patients the inflammation subsided somewhat during the course of treatment, but recurred later. In two other patients there was no appreciable change in the inflammation during the period of therapy. In the fifth patient a typical scleritis developed in the second eye while the patient was under treatment. Sulfanilamide cannot be said to have exerted a beneficial effect in any of these patients with ocular tuberculosis.

PURULENT ENDOPHTHALMITIS AND PANOPHTHALMITIS

Seven patients with purulent endoph-

CHART 4

CASES OF OCULAR TUBERCULOSIS TREATED WITH SULFANILAMIDE

Case Number	Age years	Type of Lesion	Duration of Disease before Therapy Began	Degree of Active Inflammation at Onset of Therapy	Days of Sulfanilamide Therapy	Average Blood Level	Results
15	49	Uveitis and keratitis	8 years	Moderate	49	11 mg. %	Uveitis partially subsided. Recurred 9 months later
16	38	Uveitis, scleritis, and keratitis	10 years	Moderate	7	10 mg. %	Inflammation partially subsided. Recurred 2 months later
17	52	Uveitis	2½ years	Severe	14	5 mg. %	Uveitis continued unabated
18	38	Scleritis (in one eye only)	3 months	Moderate	16	10 mg. %	Scleritis developed in other eye 6 days after beginning therapy
19	65	Uveitis	18 days	Moderate	8	3 mg. %	Uveitis continued unabated. One eye became phthisical

thalmitis and panophthalmitis were treated with sulfanilamide. Diagnosis in each case was based on a history of possible intraocular infection and the presence of definite purulent exudate within the eye. A summary of these cases is given in chart 5.

Five of the purulent intraocular infections in this series occurred following cataract extraction. In two of these the globe was destroyed, in spite of sulfanilamide therapy. Hemolytic Staphylococcus aureus and the Koch-Weeks bacillus were cultured from the conjunctival sac of one of these patients. Pneumococci were found in bacterial stains of sections from the eye in the second case. The other three patients recovered completely under intensive treatment with sulfanilamide. In one of these cases beta hemolytic streptococci were grown in pure culture from purulent exudate aspirated from the anterior chamber. This case appeared quite hopeless before chemotherapy was begun. The second of these, in which the organism within the eye was not cultured, but in which a pure culture of hemolytic Staphylococcus aureus was obtained from the conjunctival sac, also appeared utterly hopeless before sulfanilamide therapy was begun. The third, in which the infection was entirely intraocular, was less severe, but recovery appeared to be more dramatic than would reasonably have been expected without the use of sulfanilamide. One patient with endophthalmitis following a perforating injury became worse in spite of moderate doses of sulfanilamide, and enucleation was performed two days after the drug was started. In one case of B. pyocyaneous panophthalmitis, beginning as a corneal ulcer, sulfanilamide had no appreciable effect. One pa-

CHART 5

CASES OF PURULENT ENDOPHTHALMITIS AND PANOPHTHALMITIS TREATED WITH SULFANILAMIDE

Case Number	Age years	Pathogenesis	Bacterial etiology	Days of sulfanilamide Therapy	Average Blood Level	Results
20	78	Occurred 5 days after intracapsular cataract extraction	Undetermined*	6	8 mg. %	Globe destroyed
21	44	Occurred 5 weeks after intracapsular cataract extraction	Pneumococcus	3	8 mg. %	Eye eviscerated after 3 days of therapy
22	77	Present 3 days after simple linear cataract extraction	Beta hemolytic streptococcus	20	5 mg. %	Cleared progressively after 4 days of therapy. Final vision 20/40
23	66	Present 4 days after intracapsular cataract extraction	Undetermined**	12 then 10	10 mg. % 5 mg. %	Inflammation unabated for 6 days. Eye then cleared rapidly, a red reflex first appearing after 13 days of therapy. Final result excellent
24	73	Occurred 5 days after extracapsular cataract extraction	Undetermined	7	10 mg. %	Cleared rapidly and progressively after 2 days of therapy
25	38	Followed intraocular foreign body	Undetermined	4	5 mg. %	Eye enucleated after 2 days of therapy
26	32	Followed corneal ulcer	B. pyocyaneous	5	10 mg. %***	Globe destroyed. Later enucleated
27	13	Occurred 3 days after onset of meningococcus meningitis	Meningococcus (?)****	20	11 mg. %	Cleared rapidly and progressively after 2 days' therapy. Final vision 20/20

* Hemolytic Staphylococcus aureus and Koch-Weeks bacillus in conjunctival sac.
** Hemolytic Staphylococcus aureus in conjunctival sac.
*** Sulfanilamide solution (0.8 percent) also instilled locally every 2 hours.
**** No cultures taken from the eye.

tient with metastatic meningococcal panophthalmitis recovered dramatically with sulfanilamide therapy. This patient, treated two years ago, was probably the first ever to recover completely from this type of intraocular infection.

EXTRAOCULAR INFECTIONS

Five patients with infections of the lids or orbit were treated with sulfanilamide. Cultures were taken from the site of the infection in every case. Four of these cultures showed beta hemolytic streptococci, while the fifth culture showed no growth. Two of these cases were severe infections of the lid, two others were infected sockets following enucleation and evisceration, respectively, while the fifth case was in a diabetic and showed a posttraumatic cellulitis involving the lids. The five cases are summarized in chart 6.

All of these infections began to subside within 24 hours after beginning sulfanilamide, and all healed completely within several days.

TRACHOMA

Two patients with trachoma were treated with sulfanilamide. The diagnosis was based on the history and clinical appearance. No inclusion bodies could be found in either case. Both patients had an old chronic trachoma with only moderate activity. Both had been vigorously treated with copper-sulfate stick locally in the past, and had recurrences of activity after omission of this local treatment. A summary of these cases is given in chart 7.

These patients with trachoma both exhibited a remarkable clearing of injection, follicles, and corneal vascularization within a few days after the initiation of sulfanilamide therapy. There was no change in the old scarring of the corneae, but the second patient exhibited marked clearing of corneal opacities known to be

CHART 6

CASES OF INFECTION OF THE LIDS OR ORBIT TREATED WITH SULFANILAMIDE

Case Number	Age years	Type of Inflammation	Bacterial Etiology	Days of Sulfanilamide Therapy	Average Blood Level	Surgical Treatment	Results
28	24	Abscess of upper lid following a stye	Beta hemolytic streptococcus	4	2 mg. % (?)*	Incision and drainage	Temperature normal within 24 hours. Rapid healing
29	38	Abscess of upper lid following traumatic laceration	Beta hemolytic streptococcus and hemolytic Staphylococcus aureus	7	8 mg. %	None	Streptococci disappered within 3 days. Uneventful healing within 7 days
30	31	Infection of socket following enucleation	Beta hemolytic streptococcus	4	10 mg. %	None	Complete healing within 2 days. Cultures sterile within 4 days
31	3	Purulent panophthalmitis following injury	Beta hemolytic streptococcus	2	5 mg. % (?)*	Evisceration	Temperature normal within 2 days. Complete healing of socket within 7 days
32	38	Cellulitis of lower lid and cheek following trauma	No growth obtained on culture	10	8 mg. %	Incision and drainage	Rapid disappearance of inflammation

* Treated with "Prontosil solution" parenterally. No actual blood levels determined.

CHART 7

CASES OF TRACHOMA TREATED WITH SULFANILAMIDE

Case Number	Age years	Duration of the Trachoma	Days of Sulfanilamide Therapy	Average Blood Level	Results
33	27	14 years	17	6 mg. %	Conjunctival injection diminished after 2 days. Follicles progressively diminished in size after 3 days. The slight active vascularization present in one cornea gradually disappeared. No change in old scarring of corneae or conjunctivae
34	21	14 years	21	6 mg. %	Conjunctival injection disappeared within 2 days. Rapid and progressive shrinkage of follicles after 2 days. Corneal vascularization diminished markedly after 2 days, but did not entirely disappear. Marked reduction in corneal infiltration with significant improvement of vision. No change in old scars

of recent origin. These patients were observed for only a few weeks after treatment ended.

For purposes of comparison, two patients with trachoma who have been treated with intravenous tartar emetic may be cited. The first was an 11-year-old boy with a mild acute trachoma. He was given a total of 1.2 gm. of tartar emetic intravenously during a 24-day period, and on the sixth day after this course of therapy was begun a bilateral grattage was performed. The eyes began to show improvement three days after treatment was begun, and continued to improve gradually. By the end of the course of treatment the lesions were entirely healed. The second case was in a 50-year-old female with recurrent activity of a trachoma of 18 years' duration. She was given a course of tartar emetic exactly similar to that in the first case. There was considerable subjective improvement, and the thickness and redness of the lids decreased noticeably. However, the vascularization of each cornea was unaffected, and the few follicles present before treatment was begun were not appreciably diminished. There appeared to be very slight clearing of a nebulous infiltration of the right cornea, but the other cornea remained unchanged. Tartar emetic undoubtedly exerted a beneficial effect, but its effects were neither so rapid nor so extensive as the results obtained in the two cases treated with sulfanilamide. This is in keeping with the observations previously cited from the literature.

INCLUSION BLENNORRHEA

Two patients with inclusion blennorrhea have been treated with sulfanilamide. Diagnosis was based on a history of onset one to two weeks after birth, the clinical appearance, and the presence of inclusion bodies in epithelial scrapings. These two patients recovered completely

CHART 8

CASES OF INCLUSION BLENNORRHEA TREATED WITH SULFANILAMIDE

Case Number	Age Weeks	Smears and Cultures of Conjunctival Discharge	Duration of Conjunctivitis	Days of Sulfanilamide Therapy	Average Blood Level	Remarks	Results
35	4	Diphtheroids	14 days	9	10 mg. %	No local treatments	Discharge ceased within 3 days. Follicles and injection gradually disappeared within 6 days. Inclusion bodies still found on the 4th day, but not on the 7th
36	3	Negative	14 days	6	5 mg. %	Argyrol and boric irrigations locally	Discharge, follicular hyperplasia, and conjunctival congestion disappeared completely within 4 days

CHART 9

CHEMOTHERAPY IN CORNEAL ULCERS ASSOCIATED WITH CONJUNCTIVITIS

Case Number	Age Years	Duration of Ulcer	Organisms in Conjunctival Sac	Days and Type of Chemotherapy	Average Blood Level	Remarks	Results
37	27	9 days	Pneumococci	Sulfapyridine by mouth for 7 days	5 mg. %	Optochin 1% locally added to treatment one day after beginning sulfapyridine	Conjunctivitis worse after 1 day. Then gradual healing, complete within 21 days
38	28	60 days	Beta hemolytic streptococci and Staphylococcus aureus	Sulfanilamide by mouth for 4 days. Sulfanilamide solution (0.8%) instilled locally every ½ hour for 14 days	8 mg. %	Patient also had atropine reaction	Streptococci disappeared within 3 days and staphylococci within 4 days. Conjunctivitis cleared within 4 days. Ulcer became completely clean within 10 days

within six days. A summary of these cases is given in chart 8.

CORNEAL ULCERS ASSOCIATED WITH CONJUNCTIVITIS

One patient with a pneumococcal corneal ulcer was treated with sulfapyridine. The patient got a piece of straw in his eye, and during the following week the eye became progressively more painful and inflamed. At the end of that time he was found to have a moderately severe conjunctivitis and a shallow corneal ulcer, with considerable necrotic debris, in size about 3 by 4 mm. Cultures of the conjunctival sac gave a pure growth of pneumococci. The eye was treated with atropine, hot compresses, and boric irrigations for two days. During this time the ulcer became cleaner but the conjunctivitis became worse. Sulfapyridine therapy was then instituted.

One patient with a corneal ulcer associated with marked conjunctivitis (beta hemolytic streptococci and hemolytic Staphylococcus aureus recovered from the conjunctival sac) was treated with sulfanilamide. The ulcer followed an abrasion of the cornea, and grew steadily worse for two months before chemotherapy was begun. A summary of these cases is given in chart 9.

It is unwise to draw any conclusions from the case of pneumococcal ulcer of the cornea in which sulfapyridine was used. Improvement began two days after

CHART 10

MISCELLANEOUS CASES TREATED WITH SULFANILAMIDE

Case Number	Age Years	Type of Eye Lesion	Days of Sulfanilamide Therapy	Average Blood Level	Results
39	31	Acute anterior uveitis. (Associated with subacute bacterial endocarditis due to streptococcus viridans)	7	7 mg. %	No significant effect
40	68	Bilateral uveitis. (One eye showed nonspecific generalized uveitis histologically)	22	3 mg. %	No effect. One eye subsequently enucleated
41	62	Sympathetic ophthalmia	31	3 mg. %	No effect
42	36	Optic neuritis. (Etiology undetermined. Patient had subacute gonorrheal cervicitis)	6	8 mg. %	No effect on the eye lesion
43	28	Recurrent keratoconjunctivitis. (Later proved due to ocular hypersensitivity to flour)	13	10 mg. %	No significant effect

therapy was instituted, but healing was slow and might have taken place just as readily without the use of sulfapyridine. The result obtained in the second case was dramatic, when the initial appearance of the eye is considered.

MISCELLANEOUS

Five patients with miscellaneous eye lesions were treated with sulfanilamide. A summary of these cases is given in chart 10.

These cases include an anterior uveitis associated with subacute bacterial endocarditis, a nonspecific uveitis, a sympathetic ophthalmia, an optic neuritis of undetermined etiology, and an allergic conjunctivitis. Sulfanilamide had no appreciable effect in any of them.

CHART 11

SUMMARY OF 43 CASES OF OCULAR INFLAMMATION TREATED WITH SULFANILAMIDE

Type of Eye Lesion	Number of Cases	Average Days of Therapy	Average Blood Level	Results
"Gonococcal" uveitis	14	16	6 mg. %	No effect
Ocular tuberculosis	5	19	8 mg. %	No effect
Purulent intraocular infection	8	11	8 mg. %	No effect in 4 cases. Significant cures in 4 cases
Infection of lids or orbit (streptococci isolated in 4 of these)	5	5	7 mg. %	Rapid healing
Trachoma	2	19	6 mg. %	Significant healing
Inclusion blennorrhea	2	8	8 mg. %	Significant healing
Pneumococcal corneal ulcer*	1	7	5 mg. %	Doubtful effect
Streptococcal corneal ulcer	1	4**	8 mg. %	Significant healing
Miscellaneous	5	16	6 mg. %	No effect

* Treated with sulfapyridine.
** Also received sulfanilamide solution locally for 14 days.

COMMENT

The results obtained in 43 patients with ocular inflammation treated with sulfanilamide compounds are summarized in chart 11.

The fact that no significant effect was noted in the 14 cases of "gonococcal" uveitis is rather surprising, in view of the marked effect sulfanilamide has on gonococcus infections in general. It is possible that the majority or all of these cases were not due to actual gonococcal infection. An alternative explanation is that the immune reaction of the host against the gonococcus in cases of uveitis is insufficient to overcome the infection in spite of the bacteriostatic effect of the sulfanilamide. In support of this second possibility is the fact that sulfanilamide is less effective in gonococcal arthritis than in any of the more common complications of gonorrhea.[10]

The five patients with ocular tuberculosis were given sulfanilamide because of the effect of this drug on experimental tuberculosis in guinea pigs. This form of chemotherapy has not proved of value for any manifestation of human ocular tuberculosis.

The successful results obtained in three cases of postoperative purulent intraocular infection are difficult to evaluate, since the bacterial etiology in only one of these cases was determined. However, the cure in at least two of these cases was so spectacular that it seems justifiable to use sulfanilamide or sulfapyridine in all cases of this type. It is

always quite possible that the infection may be due to an organism susceptible to chemotherapy.

The result obtained in the one case of metastatic meningococcal panophthalmitis was most dramatic.

Rapid healing of almost all streptococcal infections of the lids or orbit treated with sulfanilamide is to be expected. Likewise, rapid disappearance of streptococci from the conjunctival sac, as in the one case of corneal ulcer, is in keeping with the well-known effect of sulfanilamide on these organisms.

Julianelle,[65] in speaking of the infectious agent of trachoma, concludes that it "is a virus of remarkable frailty, succumbing before physical and chemical agents tolerated by numerous other bacterial and viral agents. Biologically, it may be characterized as possessing a low infectivity, weak propagative powers, infrequent filterability, and poorly immunogenic properties." It may be that this is one infectious agent on which sulfanilamide, even in very low concentrations, exerts a destructive rather than merely an inhibitory effect.

Rapid clearing in the two cases of inclusion blennorrhea is in keeping with the result obtained by Thygeson in the case he reported.

No conclusions can be drawn from the case of pneumococcal corneal ulcer treated with sulfapyridine. However, this drug is theoretically of considerable value in the treatment of any pneumococcal infection of the eye.

The effect of the local use of sulfanilamide solution in the eye cannot at present be evaluated. Sulfanilamide solution (0.8 percent) was instilled locally in an eye every half hour for 24 hours preceding aspiration of the aqueous. The sulfanilamide concentration present in the aqueous was found to be 0.8 mg. percent.* While a concentration of 0.8 mg. percent is not high, this determination confirms the fact that sulfanilamide is very diffusible. In one patient in whom the drug was instilled locally at frequent intervals, staphylococci disappeared from the conjunctival sac within four days. This fact suggests that more was accomplished than could be expected of sulfanilamide in the concentration attainable by internal administration. However, disappearance of the staphylococci may have been coincidental.

Sulfanilamide concentrations were determined on samples of blood and aqueous obtained simultaneously from one patient who had been taking sulfanilamide by mouth for several days. The values obtained were 7.4 mg. percent for blood and 6.9 mg. percent for aqueous. These values parallel those obtained by Rambo[6] in rabbits.

Summary

1. The present status of sulfanilamide compounds in general medicine is reviewed briefly.

2. Reports of the usage of these drugs in ocular diseases are reviewed more completely. These reports indicate that this type of chemotherapy is definitely of value in the treatment of gonococcal conjunctivitis and of trachoma, is probably of value in the treatment of inclusion blennorrhea, and may be of benefit in certain cases of panophthalmitis, cavernous-sinus thrombosis, herpes simplex, and herpes zoster. The reported successful use of "Prontosil" solution locally is largely discounted, although the local use of a solution of sulfanilamide itself (which is active *in vitro*) is considered to have potential value.

3. Forty-three cases treated with sulfanilamide compounds in the Johns

* Sulfanilamide concentration determined by E. K. Marshall.

Hopkins Hospital because of ocular inflammations are reported, with the following results:

a. No appreciable effect was noted in 14 cases of "gonococcal" uveitis, either from the standpoint of alleviating the acute attack or of preventing recurrences.

b. No apparent effect was obtained in five cases of ocular tuberculosis.

c. Four out of eight cases of purulent intraocular infection exhibited spectacular cures; one of these was a metastatic meningococcal panophthalmitis, one was a postoperative panophthalmitis with beta streptococcus in the anterior chamber, one was a postoperative panophthalmitis with Staphylococcus aureus in the conjunctival sac, and the fourth was a postoperative endophthalmitis of unknown etiology.

d. Significant results were obtained in five cases of infection of the lids or orbit; four of these were known to be due to beta hemolytic streptococci.

e. Significant improvement was noted in two cases of trachoma (stage 3); improvement was more notable than in two other cases of trachoma treated with intravenous tartar emetic.

f. Two cases of inclusion blennorrhea were cured within six days.

g. A cure of doubtful significance was obtained in one case of pneumococcal conjunctivitis and corneal ulcer by the use of sulfapyridine.

h. One case of corneal ulcer associated with streptococcal and staphylococcal conjunctivitis responded significantly. (Sulfanilamide was used locally as well as internally.)

i. No appreciable effect was noted in five other miscellaneous cases.

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MALIGNANT MELANOMA OF THE CHOROID*

FURTHER STUDIES ON PROGNOSIS BY HISTOLOGIC TYPE AND FIBER CONTENT

HELENOR CAMPBELL WILDER AND G. R. CALLENDER, M.D.

In 1931 Callender[1] classified by histologic type the malignant melanomas of the eye in the American Registry of Ophthalmic Pathology at the Army Medical Museum. Four years later Callender and Wilder[2] further classified these tumors by their argyrophil-fiber content. In the same year Terry and Johns[3] reported the Massachusetts Eye and Ear Infirmary cases from the standpoint of incidence, cell type, and prognosis. In 1937 Benedict[4] published a paper on the clinical considerations of melanotic neoplasms of the eye and orbit from material in the Mayo Clinic, and Lane[5] described the results of her nation-wide survey of malignant ocular neoplasms. Interesting observations resulted from these statistical reports. Unfortunately, however, material in any single collection was relatively scant and the rate of increase slight, due to infrequent occurrence of the tumor. Thus it appeared that many years would elapse before conclusive data could be assembled. In order to overcome the handicap of insufficient material and to determine more definitely the value of prognosis by cell type and fiber content, Dr. J. S. Friedenwald suggested that an attempt be made to collect specimens of malignant melanomas of the eye from the various clinics throughout the country. The American Academy of Ophthalmology and Otolaryngology, through Dr. Harry S. Gradle, authorized this action. At the instigation of Dr. Conrad Berens an appropriation was obtained from the American Association for Research in Ophthalmology, for traveling expenses to the various institutions in which the larger collections were housed, and for preparing microscopic slides. As a result there are at the present time 1,238 cases of malignant melanoma in the Registry. Of these, 75 patients have died from causes unknown or unrelated to the primary tumor, 85 have been definitely lost, and five-year follow-ups will probably not be obtainable on approximately 200 more. We hope that the remaining 878

*From the Registry of Ophthalmic Pathology maintained at the Army Medical Museum, Washington, D.C.

By allowing the Registry the use of their material the following ophthalmologists and pathologists have increased the number of cases of malignant melanomas in the Registry from 273 in 1935 to 1,238 at the present time. We wish to thank them, as well as the regular contributors to the Registry, for their interest, coöperation, and generosity in making this work possible.

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cases will prove to be satisfactory. In 1937, of the 863 eyes sent to the Army Medical Museum for microscopic examination, 58 contained malignant melanomas. If this rate of increase continues, in a few years it should bring the collection to a thousand followed cases. It is realized that five-year follow-ups are in no way final but, as stressed by Post,[6] a prediction of freedom from metastasis even for that length of time is of indisputable importance to the patient. When a thousand cases have passed the five-year mark many of them will have been observed 10 years or longer, and an answer to some of the problems of incidence and prognosis will be assured.

The statistical studies appearing herein are based on 253 cases of malignant melonoma of the choroid and ciliary body which have been followed for five years or longer after enucleation or in which death has occurred from metastases before the expiration of that time. No cases in which enucleation was performed within the last five years are included in this series, although some have already terminated fatally, because doing so would give a high and false death rate.

Of the 129 patients living more than five years after enucleation, 35 have been followed from 10 to 24 years. Five patients died of known but unrelated causes between 5 and 10 years after enucleation, and three died of unknown causes 13, 14, and 24 years postoperatively.

One hundred and twenty-four patients, or over 49 percent, have died from metastases, the postoperative duration varying from two days to fourteen years.

In Callender's[1] first tabulation and in the report of Terry and Johns[3] the mixed-cell tumor appeared to be the most malignant. The epithelial group is still so small that definite conclusions cannot be drawn, but, with the slight increase in cases followed over five years, the percentage of metastatic deaths has also increased, placing it ahead of the mixed-cell type in malignancy rating.

Heretofore an attempt has been made to classify necrotic tumors on the basis of cell type. It is now felt that in many cases an accurate classification is not possible where only a small portion of the tumor contains living cells. Stimulated by Samuels's[7, 8] two papers on necrosis a new group has been introduced for cases in which over half the tumor is necrotic. An additional study was made of the 91 patients with tumors in which small areas of necrosis were seen, with the result that 45 percent were found to have died and over 27 percent to be living.

The other groups, both cell and fiber, remain as described in the original papers.[1, 2] A brief résumé of the basis for classification is given here for the reader's convenience.

Spindle A (fig. 1). The nucleus has a delicate, reticular structure with an ill-defined or indistinguishable nucleolus.

Spindle B (fig. 2). The nucleus contains a rather coarse network and a prominent nucleolus.

Fascicular (fig. 3). The term describes

PLATE 2 (WILDER AND CALLENDER).

FIG. 1. SPINDLE-CELL, SUBTYPE A. HEMATOXYLIN AND EOSIN. ×700.
FIG. 2. SPINDLE-CELL, SUBTYPE B. HEMATOXYLIN AND EOSIN. ×700.
FIG. 3. FASCICULAR TYPE. HEMATOXYLIN AND EOSIN. ×230.
FIG. 4. EPITHELIOID-CELL TYPE. HEMATOXYLIN AND EOSIN. ×700.
FIG. 5. MIXED-CELL TYPE: SPINDLE-CELL SUBTYPE B AND EPITHELIOID HEMATOXYLIN AND EOSIN. ×700.
FIG. 6. FIBER GROUP 3. WILDER RETICULUM STAIN. ×700.
FIG. 7. FIBER GROUP 2C. WILDER RETICULUM STAIN. ×700.
FIG. 8. FIBER GROUP 2B. WILDER RETICULUM STAIN. ×700.
FIG. 9. FIBER GROUP 2A. WILDER RETICULUM STAIN. ×700.
FIG. 10. FIBER GROUP 1. WILDER RETICULUM STAIN. ×700.

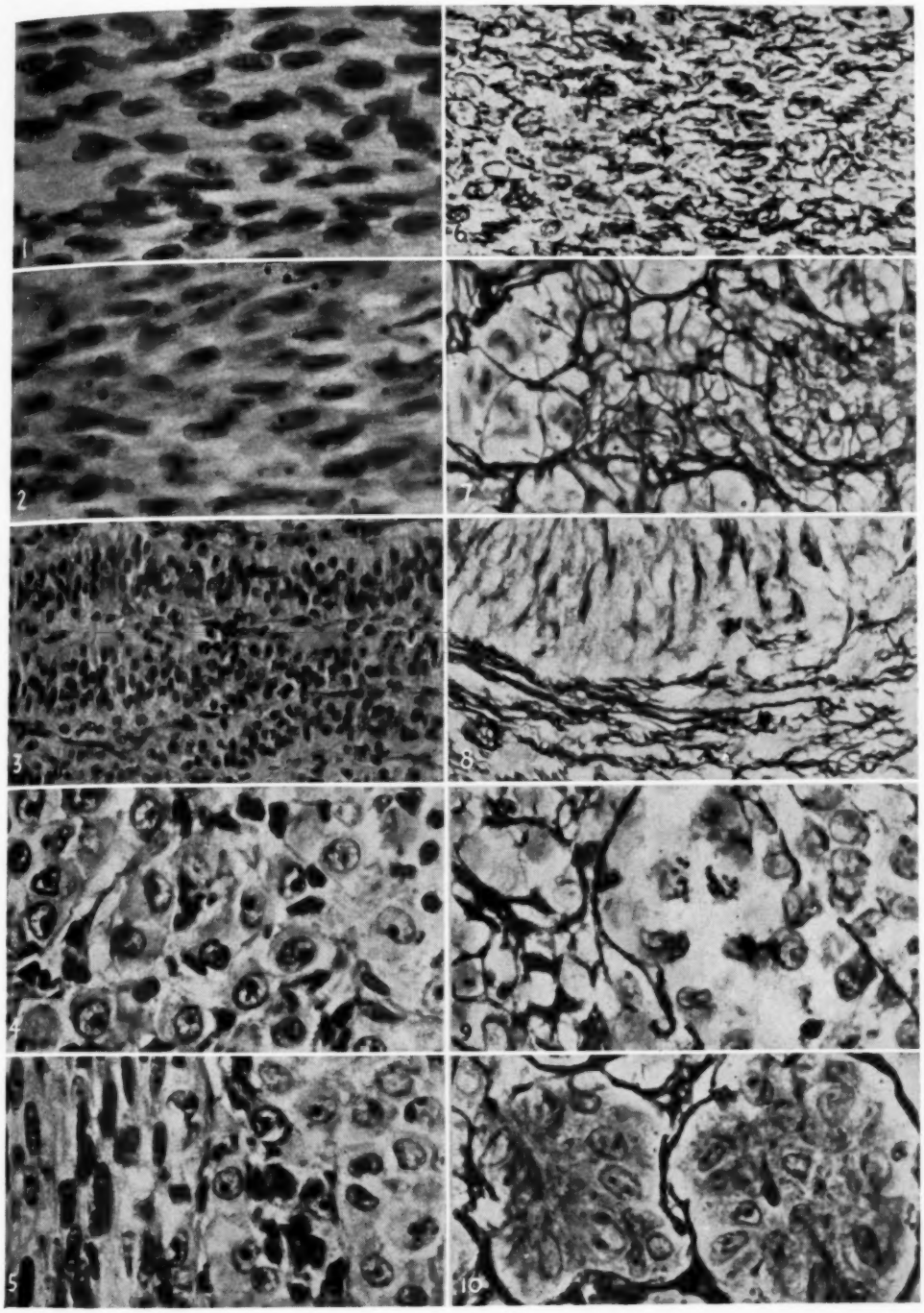

PLATE 2 (WILDER AND CALLENDER)

the arrangement of the cells in strips rather than their morphology. The cells resemble the spindle-B type.

Epithelioid (fig. 4). Round or polygonal cells, usually rather large but with considerable variation in size and shape. The nucleus is large, round, or somewhat oval, the nucleolus distinct.

Mixed (fig. 5). A combination of two or more cell types, with the exception of spindle-A and -B tumors which are included in the spindle-B series. The most usual combination in the mixed group is spindle B and epithelioid.

The fiber classification is based on the relative content of argyrophil fibers, as demonstrated by the Wilder reticulum stain.[9] It has been our experience, as well as that of King,[10] that sections of heavily pigmented melanomas should be rather thoroughly bleached in potassium permanganate and hydrobromic acid before impregnating with silver.

Group 1 (fig. 10). Tumors having no fibers, or fibers only in the interlobular stroma.

Group 2 (figs. 7, 8, 9). Those having areas with and without fibers; that is, a combination of groups 1 and 3. This group is subdivided into (a) tumors having a definite preponderance of fiberless areas, (b) tumors having areas with and without fibers approximately equal, (c) tumors having a definite preponderance of areas containing fibers.

Group 3 (fig. 6). Tumors having, in all areas, fibers forming a network about individual tumor cells.

Both classifications are based on the examination of single slides or of a very few slides from each case taken as nearly as possible through the center of the tumor and to include the uveal attachment. There is room for criticism here, and we do not imply that the criteria are necessarily uniform throughout the individual tumors but serial sectioning is impractical as a routine procedure and impossible on previously sectioned material.

Summary

There are 1,238 malignant melanomas of the eye in the American Registry of Ophthalmic Pathology at the Army Medical Museum which, with few exceptions, have been classified according to their cell type and fiber content. It is hoped eventually to have a thousand such cases that have been observed for at least five years postoperatively.

Forming the basis of this report are 253 patients with malignant melanomas that have arisen in the choroid or ciliary body, who have been followed at least five years after enucleation or who have died from metastases under five years. The total death rate for this group is less than 50 percent.

The prognostic value of classification both by cell type and fiber content is indicated by the consistent results demonstrated in tables 1 and 2 as well as in all our former tabulations. In the classification by histologic type the epithelioid cell appears to be the most malignant, the spindle-cell subtype A relatively benign. As would be expected, the mixed group, which in almost all cases contains epithelioid cells, is second in malignancy to the purely epithelioid tumor.

In the classification by fiber content, malignancy of the tumor appears to be inversely proportional to the degree of intercellular invasion by argyrophil fibers.

To present an example of the importance and practical application of utilizing both methods of classification: A mixed-cell tumor does not often metastasize if it is heavily fibered, but a moderately fibered mixed-cell tumor is far more apt to metastasize than is a spindle B having approximately the same fiber content.

The outstanding facts brought forth

TABLE 1

CLASSIFICATION BY HISTOLOGIC TYPE AND FIBER CONTENT OF 253 MALIGNANT MENANOMAS OF THE CHOROID AND CILIARY BODY FOLLOWED FIVE YEARS OR MORE.

Fiber Content	1 No Fibers Among Tumor Cells		2A Less than 50% Fibers		2B About 50% Fibers		2C More than 50% Fibers		3 Fibers Throughout All Areas		Total Cases	Percent Dead	Average Post-Operative Duration of Dead Cases, Years
Cell Type	Total Cases	Percent Dead	Total Cases	Percent Dead	Total Cases	Percent Dead	Total Cases	Percent Dead	Total Cases	Percent Dead			
Spindle A			3		6		6		3		18		
Spindle B	2	100	27	25	18	11	9	22	5		61	21	2-4/12
Fascicular	1	100	2	50	1						4	50	1
Epithelioid			2	100	3	66					5	80	4-10/12
Mixed	5	100	67	70	40	67	22	40	1		135	65	2-10/12
Too necrotic to classify	3	100	11	81	11	36	4	25	1		30	56	4
Total	11	100	112	58	79	44	41	29	10		253	49	2-11/12

TABLE 2

CLASSIFICATION BY FIBER CONTENT AND HISTOLOGIC TYPE OF 253 MALIGNANT MELANOMAS OF THE CHOROID AND CILIARY BODY FOLLOWED FIVE YEARS OR MORE.

Cell Type	Spindle A		Spindle B		Fascicular		Epithelioid		Mixed		Necrotic		Total Cases	Per cent Dead	Average Post-Operative Duration of Dead Cases Years
Fiber Content	Total Cases	Per-cent Dead	Total Cases	Per-cent Dead	Total Cases	Per-cent Dead	Total Cases	Per-cent Dead	Total Cases	Per-cent Dead	Total Cases	Per-cent Dead			
1. No fibers among tumor cells			2	100	1	100			5	100	3	100	11	100	2-3/12
2A. Less than 50% fibers	3		27	25	2	50	2	100	67	70	11	81	112	58	3-2/12
2B. About 50% fibers	6		18	11	1		3	66	40	67	11	36	79	44	2-11/12
2C. More than 50% fibers	6		9	22					22	40	4	25	41	29	3-5/12
3. Fibers throughout all areas	3		5						1		1		10		
Total	18		61	21	4	50	5	80	135	65	30	56	253	49	2-11/12

In many instances the percentage of deaths is a fraction higher than appears in these tables. The plus sign, as well as the fraction, has been omitted for simplification.

by this study are that no deaths have occurred from any spindle-cell subtype A or fiber group-3 tumor and that the patient in all cases in which no argyrophil fibers appear among the tumor cells has died.

It is concluded that the two classifications, used in conjunction with each other, definitely narrow the field of error in the prognosis of uveal melanoma.

The writers are particularly indebted to Lt. Col. James E. Ash, Curator, Army Medical Museum, for his encouragement and assistance in the collection of the material and the preparation of this report. We also wish to thank Captain Elbert DeCoursey and the members of the Museum staff for their valuable coöperation.

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LECTURES ON MOTOR ANOMALIES*

XII. Ocular spasms

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Ocular spasms, frequently met in functional neuroses and hysteria, require consideration not only because of their importance in the making of a differential diagnosis, but also in order to clear up the many misunderstandings and contradictions found in the discussion of alleged paralyses of hysterical or neurotic origin. Whether or not such paralyses occur has been a moot point to this day. Uhthoff,[1] like so many ophthalmologists and neurologists, while refusing to accept hysteria as a cause of the paralysis has, strange to say, referred to "publications which affirm beyond doubt the exceptional occurrence of hysterical paralyses of even individual muscles of the eyes." I think that one is not only entitled but is obliged to doubt the reliability of the observations reported as instances of purely hysterical paralysis. The investigations made in many cases were not exact and exhaustive, or the results were not interpreted correctly, or the length of time available for the observation was not sufficient, so that a disease organic in nature but complicated by hysterical symptoms, could not be excluded as a possible cause of the paralysis. The dictum of Mauthner, that the frequency of hysterical disturbances of ocular muscles is directly proportional to the ability to produce at will the condition concerned, is still valid today. Accordingly, certain spastic disorders of ocular muscles are met most frequently in cases of hysteria, since the corresponding innervation is governed by the will and the spastic movements can be learned by exercise and initiated by suggestion. Sometimes blepharospasm is the only hysterical stigma, and it is often caused by trauma or disease of the eyes or of their adnexa. Convergence spasm also frequently occurs in hysteria, sometimes as its only symptom, but generally associated with spasm of accommodation and contraction of the pupils. The inconstancy of the angle of squint and the prompt success of suggestive treatment prove the functional nature of the convergence spasm, notwithstanding the fact that the cause could be an anomaly of organic origin.

During the World War I examined a soldier who, nine months before, had been wounded near the interior angle of the eye by a piece of splintered shell. He complained of diplopia, poor vision, headache, and vertigo. I found that he had spastic ptosis, spasm of convergence and accommodation, intense miosis, and continuous tremor of the head. The poor vision, due to spasm of accommodation, could be improved by concave glasses; but when one eye was covered the vision became normal immediately without any glass. An examination of the muscles of the eyes revealed the presence of paralysis of both depressor muscles of the left eye due to the trauma. When asked more closely about the diplopia, the patient told me at first that he had been greatly annoyed by the diplopia, the images being

* From The Dartmouth Eye Institute, Dartmouth Medical School. Read before the Seventh Annual Mid-Winter Course of the Research Study Club, Los Angeles, California, January, 1938.

[1] Uhthoff, W., in Graefe and Saemisch's Handbuch der gesamten Augenheilkunde, Leipzig, Wilhelm Engelmann, 1915, vol. 11, pt. 2B.

at different levels. Endeavoring to overcome the trouble he found some relief when he made a strong convergence effort, by which one of the images was shifted to the periphery of the visual field so that it was less noticeable, while simultaneously both images became indistinct.

The case is interesting because it shows the development of the characteristic ocular symptoms of a functional neurosis, based on paralysis of organic origin. The symptoms of paralysis were masked by the strong convergence spasm so that they could be revealed only by an exceptionally careful examination. Until this was done, every kind of treatment, of course, had been fruitless. The disappearance of the spasm could be effected only temporarily by putting an opaque glass before one eye, which eliminated the troublesome diplopia. The patient was cured definitely as soon as binocular single vision was restored by advancement of the paralyzed inferior rectus muscle.

Conjugate deviation of the eyes has been observed in some cases of hysteria. It is always easy to prove that this is not caused by an associated paralysis.

Bilateral nystagmus of hysterical origin is rare and is never the only symptom of hysteria; it is almost always connected with spasm of the orbicularis and convergence muscles. The nystagmic movements are exceedingly fine and rapid, much more rapid than in any other kind of nystagmus.

Hysterical associated paralyses of the movements of the eyes have been described repeatedly, especially during and after the War; they were caused by hardships and emotional excitement or by severe nervous shock. At first the symptoms may be similar to those in cases of so-called pseudo-ophthalmoplegia: inability to move the eyes at word of command and, in some cases, to follow the moved object of fixation; on the other hand, the fixation was maintained when the patient's head was rotated passively not only by a sudden jerk but also quite slowly. At times, however, spontaneous movements of the eyes could be observed when the patient was left to himself, or was talking with other patients, or reading a paper. The true functional nature of the paralysis could be proved only by the success of suggestive treatment.

That the manifestations of convergence or divergence paralysis are sometimes based on a functional neurosis, and how this can be proved, have already been discussed.

Cases of hysterical divergence spasm combined with other hysterical symptoms have been described by Kehrer and other authors. It seems to me more likely that in some of these cases divergence spasms have been simulated by an exophoria that became manifest intermittently, especially during attacks of blepharospasm in which the eyes have a tendency to diverge on account of their elevated position. True divergence spasm, I am sure, occurs only quite exceptionally, manifesting itself in a divergence of such instability as one never encounters in simple exophorias.

I have never seen either paralysis of individual ocular muscles or unilateral ophthalmoplegia of a true functional, that is, nonorganic, nature, and in the publications on this subject I have not found a description of any case that convinced me that the supposition of a functional origin of the paralysis was correct. Either the proof of the paralytic character of the related symptoms was equivocal, so that they could just as well have been due to nonparetic anomalies, or the patient was not kept under observation long enough to exclude the organic nervous disease, which, of course, may be complicated by

hysterical symptoms. Only unilateral, nonspastic (flaccid), hysterical ptosis occurs definitely. This is not strange, inasmuch as even a normal person can train himself to relax completely one of the elevators of the upper lids. Unilateral (pseudo-) ptosis is described much more frequently as a hysterical sign, but it must be emphasized that in such cases an organic lesion as the starting point cannot always be excluded.

Several years ago I was asked to give an opinion on a patient suffering from various troubles that he attributed to contusion of the head sustained in an automobile accident. His physician, not being able to find any evidence of an organic lesion, had made a diagnosis of traumatic neurosis. At last, after the case had been submitted to arbitration, I was asked about the nature of the blepharospasm in the right eye. After I had, with much trouble, induced the patient to open his right eye, I could find nothing abnormal in the eye itself, but upon investigating the motor apparatus I discovered a slight paresis of the superior rectus muscle of each eye. The patient had never complained of diplopia and, when asked, did not remember ever having had it. But I was forced to admit that the blepharospasm was probably caused by the accident, perhaps by a hemorrhage within the nuclear region, and that the patient, although not conscious of seeing double, felt constrained by the blurred vision, to keep one eye closed.

In recent publications, especially in Germany, another kind of hysterical disturbance has been discussed; namely, the so-called dissociation of movements of the eyes. It was first described by Kunn, as follows: The eyes are not held rigidly in a certain position as in real spasms, nor do they obey the patient's will, but move about rather irregularly, one eye independently of the other, as in a comatose condition. The supposition that the association of movements of the eyes can be suspended temporarily merely as a symptom of hysteria is a strong contradiction of all physiologic and clinical facts by which the general validity of Hering's so-called law of the association of eye movements is proved. Dissociated movements of the eyes occur in a comatose state, in narcoses, and during sleep; that is to say, in conditions in which the muscles of the eyes are governed neither by the will nor by the compulsion to fusion but may receive stimuli of subcortical origin. However, it is beyond one's volitional power to innervate either an individual eye muscle or the muscles of one eye alone, and the contrary assertion depends on a misunderstanding of Hering's law. The occurrence of unilateral or asymmetrical movements of the eyes by no means proves, as I emphasized in my first lecture, that these movements arise from asymmetrical innervations of the two eyes. If two innervations, one driving both eyes in the same direction, for instance to the right, and another driving them into convergence, arrive at the same time, the result must be an asymmetrical or unilateral movement in spite of the fact that both eyes are influenced equally by the same impulses. The symptoms adduced as proof of dissociation cannot, on critical examination, be accepted as such. They could be due to heterophoria becoming manifest intermittently, according as the patient is attentive and interested in the test object or tired and listless, or to organic disease complicated with hysteria. Both could not be excluded in any given case. Since some of these patients were unable to fixate an object in spite of normal mobility and sufficient visual acuity, I am inclined to assume that there was a lack of voluntary impulses because of an in-

hibited cortical function, as is the case in the hypnotic state.

What is most characteristic of hysterical disturbances of ocular movements is their inconstancy and amenability to treatment by suggestion. In any case of hysteria complicated by apparently unusual motor anomalies of the eyes one must take into consideration the various possibilities of their origin, as just discussed, particularly the coincidence of simple heterophorias with hysterical spasms or organic lesions.

If spasm is to be understood as the effect of an excessive innervation, the occurrence of spasms of an individual muscle or of a muscle group in one eye is extremely rare. Many cases described in the literature that have been interpreted as spasms did not show unequivocal signs and symptoms of spastic origin. I have never seen spasms of individual muscles, either in hysteria or in convulsive attacks, in which spasms of convergence as well as of associated parallel movements are frequently encountered. Some authors take the secondary deviation of the sound eye in cases of paresis of the other eye as a spastic phenomenon. I look at it in a different light. In most of these cases secondary deviation is not due to a spasm but simply to the effect of the increased innervation necessary for the action of the paretic muscle. According to the fundamental law of ocular movements, the sound eye receives the same innervation and responds to it in the normal way, whereas the reaction of the paretic eye is abnormally weak. Nor can the contracture of the antagonists of a paretic muscle, if it is based on a structural change of the antagonists, be interpreted as a spasm. That would be admissible only in those cases in which an unusually high deviation is to be attributed to an increased tonus, not to a structural change of the antagonists of the paretic muscle. Overaction of the inferior oblique, be it a primary or secondary anomaly, as it was described in one of the previous lectures is, from my point of view, no spastic phenomenon, because it originates either from a structural change of the muscle in long-lasting pareses of the trochlear nerve, or from congenital or acquired deficiencies of the check ligament of the inferior oblique muscle.

The most frequent spasms of conjugate movements are found in cases of recent cerebral lesions. Conjugate deviation, as it was discussed in a previous lecture, as a rule, is caused by several factors. One of these is the paralysis of an associated group of muscles while the antagonistic group not only ceases to receive its inhibitory innervation but, in addition, may be stimulated if the lesion extends to the other hemisphere. It is due mainly to the spastic factor that conjugate deviations of considerable magnitude sometimes disappear within a few hours, as soon as the patient regains consciousness. Spasms of conjugate vertical, mostly upward, movement are almost pathognomonic signs of postencephalitic Parkinsonism; the attacks occur at irregular intervals, favored by bright light and psychic excitations. They last from a few minutes to several hours and, as a rule, are combined with spasms of convergence. During the attacks, the patients are unable to turn the eyes downward for more than a second.

In the discussion of alternating hyperphoria, I asserted that there were signs and symptoms that pointed to abnormal excitations of the vertical divergence innervations producing either unilateral or alternating vertical divergence movements. In those cases, as well as in the very rare cases of divergence excess and in convergence spasm, the instability of the position of the eyes relative to each

other is the main characteristic of their spastic origin in contrast to the abnormal positions of the eyes, the relative stability of which points to an anatomico-mechanical basis.

Nystagmus represents a particular kind of spasm in which, as a rule, two antagonistic muscle groups are involved. In the majority of cases the movements are parallel and take place in the horizontal direction. Unilateral vertical nystagmus occurs in rare cases of unilateral amblyopia. All kinds of associated as well as dissociated ocular movements are to be met with in miners' nystagmus. The eyes, in addition to vertical, horizontal, and rotary movements, perform peculiar oblique and circumductional movements; they are stopped by alcohol and light and aggravated by physical effort and darkness. In the etiology of miners' nystagmus, insufficient illumination in pits, where safety lamps are used, is the chief factor. Typical pendulumlike nystagmus arises in earliest childhood in cases with either congenital or acquired bilateral amblyopia, albinism, color-blindness, and strabismus. Hereditary tendency is not infrequently demonstrable and may account for the voluntary nystagmus that some people can produce. Labyrinthine or vestibulbar nystagmus is always a jerky, never a pendulumlike nystagmus. It is produced either by disease of the labyrinth or artificially by Barany's tests, or by lesions of the vestibular nerves or nuclei as, for instance, in cerebellar abscesses, tumors of the brain, particularly those in the cerebellar and pontine region. In jerky nystagmus the eyes make a slow swing in one direction followed by a quick return. It is a rather frequent sign of multiple sclerosis and epidemic encephalitis, combined with and perhaps owing to associated ocular pareses. If a strong innervation has, for a moment, turned the eyes toward the paretic side, they cannot stay there for any length of time but move slowly back to their primary position, and the impulse has to be renewed if the tendency to look to the paretic side continues.

In the foregoing lectures on motor anomalies only a few suggestions could be given as to the importance of the physiologic fundamentals for the analysis of clinical phenomena as the starting point for a rational therapy. In view of the immense diversity presented by the motor anomalies of the eyes, I always warn emphatically against following any schematic formulas in examining and treating motor anomalies. One must be and will be independent of them if one has become familiarized with the physiology of the ocular muscles and with the sense of space. All the principles of the methods of investigation as well as of the diagnosis and treatment must be derived from the physiological laws.

INTERMITTENT OCCLUSION OF THE CENTRAL RETINAL ARTERY*

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Although temporary impairment of vision as from acute glaucoma, ciliary spasm, and migraine is not uncommon, complete temporary blindness is very unusual. Even before the advent of the ophthalmoscope it was attributed to transient retinal ischemia, but as the knowledge of retinal vascular disease increased, the condition was recognized as usually being due to intermittent occlusion of the central retinal artery, the majority of the cases being described as spasm of the central retinal artery.

Since the fundus is normal between attacks, which are of short duration and irregular occurrence, it is unfortunate that the physician does not usually have the opportunity to examine the patient ophthalmoscopically during an attack, the diagnosis being assumed from the subjective symptoms alone.[1, 2, 3] Several authors [1, 4, 5] have reported such cases ending in permanent occlusion of the central artery with fundus findings of embolism of the central artery. Troncoso[6] states that in cases of embolism due to obliterative endarteritis, there are usually prodromal attacks of blindness or blurred vision before the final loss of sight occurs.

Langdon[4] in 1914 was able to find eight cases in the literature in which the fundus was observed during an attack and the occluded vessel seen. Crisp[7] in 1921 found five additional cases in the literature, but his case cannot be included as there was only a single attack with a permanent field defect. There have been a number of similar cases reported since that time.[8 to 13]

The classic example most often quoted in the literature is the case of Harbridge.[14] The patient, a man aged 49 years, had no unusual ocular findings when first examined. He stated that the previous day he had noted numerous attacks of blindness in his left eye varying from one to five minutes, recurring about very two hours, but on the present day they had been noted about every 40 minutes. The sight invariably left from the nasal side of the field as if a veil were being drawn before it until all vision was lost. The first attack came on while the patient was bending over, and all subsequent attacks practically followed any movement requiring a bending position. While he was being examined an attack took place. "The inferior temporal artery gradually became lessened in caliber until completely collapsed, followed rapidly by the inferior nasal and the superior arteries undergoing the same change; following quickly upon the arterial change, the veins underwent a similar process until the entire retinal circulation looked very much like ribbons against the fundus. The head of the nerve became pallid; the retina became somewhat hazy. After the fundus remained in this condition four minutes, gradually the inferior artery began to fill quickly, followed by the others, immediately the veins began to fill, the inferior becoming enormously distended. Sight did not return synchronously with the filling of the vessel, but followed immediately after." The attacks continued with more or less frequency for 10 days, ceasing after a thorough purging.

*From the Department of Ophthalmology, Oscar Johnson Institute, Washington University Medical School. Read before the Saint Louis Ophthalmic Society, January 27, 1939.

Another typical case is that of Bruner.[8] A man, aged 34 years, had first noted sudden loss of vision in the left eye lasting several minutes on the day when first seen. He had several similar attacks during the day. Ophthalmoscopic examination was not unusual. "During the attacks the vision, in a few seconds diminished to hand movements only, and the fundus of the left eye showed the following striking picture: The nerve and retina decidedly paler than in the right eye; the arteries are all markedly contracted, appearing as mere threads; the veins show entire cessation of blood flow, the venous pulse ceasing entirely; the blood in the veins assumes a granular appearance due to the breaking up of the normal blood column; in from one to three minutes the flow of blood in the vein recommences, at first slowly, then more rapidly, the venous pulse reappears, the arteries assume their normal caliber and appearance and vision rapidly returns to normal." In three days the attacks had increased in number to 10 a day, but at the end of a week disappeared permanently, the treatment being sodium bromide, nitroglycerin, cathartics, meat-free diet, and no tobacco.

A very similar case to the two above is being reported here not only because of its rarity, but because the attacks could be induced almost at will, thereby greatly assisting in the study of the condition; and because this case seems unique in that fundus photographs were obtained during an attack.

Case report

H. R., aged 60 years, a German-American laborer, was admitted to the Washington University Eye Clinic on March 9, 1938, complaining of intermittent loss of vision in his left eye.

He had been refracted in the clinic on March 20, 1935, having worn bifocal glasses since the age of 42. At that time his ocular examination was not unusual except for hyperopia as follows: with O.D. +3.25 D. sph., V. = 6/6; and O.S. +2.50 D. sph., V. = 6/6; with add +2.50 D. sph., O.U. he read 15 type.

He had no other ocular complaints until about March 1, 1938, when he noted a sudden loss of light perception in his left eye. For the previous two weeks he had been employed digging a cellar under a house, a job which necessitated marked exertion while bending almost double. The first attack came on while he was doing this work, but vision became normal within a few seconds after he had stood erect and rested. He had three similar episodes of loss of vision the same day, all of which were associated with straining in a cramped position and were promptly relieved by rest and standing erect. During the next few days he continued to have these attacks while working. He also had a few following less strenuous exertion as walking, leaning over, and turning the head suddenly.

The loss of vision is sudden, with no warning, and is complete—no perception of light remaining. The loss is usually only for short periods, varying from a few seconds to several minutes, a few having persisted for as long as 10 minutes. The return of vision is "as if a dense black smoke were rolling away from in front of the sun"; it is gradual, usually starting in the inferior field and progressing to the superior field as if a curtain were rising; it also at times returns from the center toward the periphery as if a pinhole were slowly and evenly expanding.

The patient has no other ocular complaints, there being no ocular discomfort, headaches, nor poor vision. Between attacks the left eye is perfectly well; in fact, the acuity of the left eye is slightly better than that of the right.

Ocular examination. Vision in the right

eye was 6/60, with correction 6/10+ ; in the left eye 6/60, with correction 6/7.5.

The lids, conjunctivae, and lacrimal apparatus were not unusual. The corneae, irides, and anterior chambers were normal.

The pupils were round, equal, and regular. They reacted actively to light and during accommodation.

The extraocular muscles were intact, but convergence seemed weak. There was no movement under cover.

Tension (Schiötz) was 17 mm. Hg in each eye.

The visual fields, both peripheral and central, were normal.

Ophthalmoscopic examination. Media were clear. The discs were of good color and outline. The arteries were essentially normal in appearance, but there may be an early minimal sclerosis as shown by a slight increase in light reflex and some very small changes in vessel caliber. No exudates nor hemorrhages were noted. The maculae were normal.

At the first visit there was no evidence of ocular disease, but on return three days later, an attempt to reproduce the loss of vision was successful. The conditions of the patient's work were duplicated by marked exertion as he was bending over. After several minutes of effort, he stated that his left eye was completely blind.

Immediate ophthalmoscopic examination revealed that all the retinal arteries were reduced to thin white threads that could be seen only with difficulty. The veins seemed normal. The disc was pale and the retina hazy, but no red spot was seen at the macula. The phenomenon disappeared in a few seconds before it could be studied in detail. However, during the next few days similar exercise induced the condition many times, lasting from a few seconds to several minutes. About a third of the attempts were unsuccessful. The appearance of the fundus was usually the same with complete obliteration of the central retinal artery and its branches. The inferior temporal vessel seemed to be the least affected. The actual closure was at no time observed, as the patient was always exercising at this time, but it was noted that the vessels filled several seconds before vision returned. It was also observed that there was usually a dilation and distention of the retinal veins for 10 or fifteen minutes after disappearance of the retinal occlusion. Although the condition could be reproduced fairly regularly, it was often so transient that it was fortunate that satisfactory fundus photographs were obtained.

After examination in the medical clinic, the patient on March 21, 1938, was admitted to the Medical Service in Barnes Hospital for detailed study and observation.

Except for the intermittent loss of vision already described, the patient stated that he was in excellent health with no complaints. He had always been well and strong and had been very active physically all of his life, gymnastics being his hobby.

At the age of 19 years he had an inflammation of the left side of the face, probably from a gumboil, with swelling so great that the eye was swollen shut. This was lanced and pus drained, healing with the present scar. When 20 years old he was in the hospital for three weeks with inflammatory rheumatism, both knees being swollen, red, and painful. At the age of 39 he was again in the hospital with another attack of rheumatism which started in the left foot, spreading to arms, legs, shoulders, and hands. He recovered fully with no recurrence or complications. When he was 31, he had typhoid fever for four weeks, which left him with an alopecia, for which he has worn a toupee for 15 years. Two years previously he fell 20 feet from a roof, injuring the left

side of his face and causing a very severe black eye. He denied any venereal infection. The family history was not unusual.

Physical examination disclosed the patient to be well developed, of stocky build, and with ruddy hands and face.

The head was symmetrical; the ear canals and membranes were normal. The mouth had several edentulous areas; the left upper canine was loose, and there were some dental caries. Considerable infection was seen along gingeval margins. There was marked hypertrophy of the left tonsillar tissue. The jugular glands were palpable bilaterally.

Neck: The thyroid was not enlarged. There was no adenopathy.

Chest: Expansion was full and equal. The lungs cleared to auscultation and percussion. There was some emphysema.

Heart: Rhythm was regular, 80 to 84 per minute; slightly enlarged; sounds were not unusual; no murmurs. Blood pressure was 140/90.

Abdomen: No rigidity, tenderness, nor masses were found.

Rectal: No unusual conditions were observed.

Extremities: The radial arteries were palpable, the feet slightly suffused and cyanotic. Dorsalis pedis and posterior tibial present but not strong. A very large varicosity was observed over the medial aspect of the left leg with some induration over it.

Neurological: Not unusual.

Laboratory examination.

Urine: Specific gravity was 1.017; no sugar nor albumen, no red blood cells, white blood cells, nor casts. P. S. P. (intravenous) 70 percent in 40 minutes; concentration 1.018, dilution 1.004.

Blood: Kahn test was negative; red blood cells, 5,788,000 on an average of four counts; hemoglobin, 99 percent (Newcomer); white blood cells, 7,700; the Schilling count, normal.

Blood chemistry: Sugar, 92 mg. percent; urea N, 16 mg. percent; calcium, 9.8 mg. percent; phosphorus, 3.5 mg. percent.

Spinal fluid: 4 cells per cu. mm.; Pandy test, negative; total protein, 49 mg. percent; colloidal gold, 000 121 0000; Wassermann test, negative; Cholesterol, 330 mg. percent.

Basal metabolic rate was −9 percent and +4 percent.

Electrocardiogram showed some right ventricular extra systoles but no evidence of myocardial damage.

Roentgenological examination disclosed a normal skull; chest and lungs clear; some scoliosis of the dorsal spine. Fluoroscopy showed widening of the aortic shadow due to sclerosis.

Ocular examination. History and examination were as already noted.

Manifest refraction: Vision was O.D. 6/30, with +3.25 D. sph. $\bigcirc\!\!\!\!\!\!=$ +.50 D. cyl. ax 180° = 6/5; O.S. 6/20+, with +2.25 D. sph. $\bigcirc\!\!\!\!\!\!=$ +.75 D. cyl. ax. 20° = 6/5; with add +2.50 D. sph., O.U. he read 15 print at 32 cm.

Muscle balance (Maddox rod):

20 feet: 3$^{\Delta}$Rt. Hyperphoria 12$^{\Delta}$Exophoria
14 inches: 2$^{\Delta}$Rt. Hyperphoria 32$^{\Delta}$ Exophoria

Prism divergence 12$^{\Delta}$, prism convergence 20$^{\Delta}$; convergence near point, 18 cm.

Tension taken shortly after an attack was O.D. 17 mm. Hg; O.S. 15 mm. Hg (Schiötz).

Fields taken within one-half hour after an attack were full peripherally to 3/330 white. Central fields to 2/1,000 white and 5/1,000 red and blue were normal.

While in the hospital subjective loss of vision was noted following forced hyperventilation during physical examination and twice spontaneously while lying quietly in bed. Digital compression of the globe produced subjective loss of

vision without any noticeable fundus change. Pressure on the carotid sinus produced no subjective nor objective change.

Dr. W. B. Kountz of the Vascular Division found that the subjective change was brought on by exercise and intravenous injections of epinephrine, the latter being not so clear-cut as the exercise. Dilators of the vascular system appeared to prevent the phenonemon, which seemed to appear with elevation of blood pressure to 180/100—180/110.

With the aid of Drs. Dan Myers and Paul Hageman of the Medical Department the following tests were performed:

(1) Compression of neck with blood-pressure cuff while spinal puncture needle was in place: original pressure, 260 mm. water; cuff to 20 mm. Hg, 325 mm. water; cuff to 40 mm. Hg, 450 mm. water; release, 250 mm. water. There was no loss of vision nor fundus change, and no elevation of the blood pressure.

(2) When tilted at 45 degrees with head down for 20 minutes, there was no effect on the blood pressure.

(3) When both feet and right hand were in ice water for 15 minutes, the blood pressure rose 20 mm. Hg to 150 systolic.

(4) Valsalva experiment: Upon forced expiration while holding breath, the blood pressure dropped from 130/92 to 112/96.

(5) Hyperventilation from inhalation of 30 percent CO_2 brought about no change in the blood pressure.

(6) Inhalation of amyl nitrite caused a drop in blood pressure to 110/55.

None of these tests produced the complete occlusion that had been noted after exercise. However, after several of the tests, particularly the Valsalva, and, to a lesser extent, after tilting and ice water, some slight loss of vision was noted with a questionable attentuation of the arteries of the left fundus. No change was noted after CO_2 or amyl-nitrate administration. A short time after these tests, a complete occlusion was precipitated by exercise, which seemed to be the only means by which an attack could be induced.

On two occasions, after the patient had taken nitroglycerin, gr. 1/1000, under the tongue, an attack could not be precipitated even after violent exercise.

The patient was discharged from the hospital March 30, 1938, with the following diagnoses: 1. Intermittent occlusion of the central retinal artery, left. 2. Moderate hypermetropia with a slight amount of astigmatism, correction giving normal vision. 3. Exophoria, marked, from convergence insufficiency plus divergence excess. 4. Arteriosclerosis generalized, moderate. Retinal, minimal. 5. Emphysema, postural, the increase in red blood count probably being secondary to this. 6. Chronic tonsillitis. 7. Dental caries. 8. Varicose veins, left leg.

He was referred to the clinic and given the following advice and prescription: 1. No heavy exercise at present. 2. Abstinence from tobacco and alcohol. 3. Erythrol tetranitrate, gm. 0.15, three times a day. 4. To carry an amyl-nitrite perle continually and inhale the contents if loss of vision lasts longer than a few minutes. 5. If the loss of vision continues, to come to the hospital immediately for a paracentesis of anterior chamber and an injection of acetylcholine.

When he was seen one week later he stated that he had been taking the erythrol tetranitrate regularly and had had no attacks, but that he had been doing no heavy work. At this time the occlusion could not be induced by exercise.

He was next seen seven weeks later and had ceased taking the drug about four weeks before. He had been free of attacks, although he had been working regularly. An attack could not be elicited.

He was last seen on January 25, 1939, 11 months after the onset. He had been working hard every day without any sug-

gestion of an attack of loss of vision. His general health was good except for occasional dizziness. Vision was O.D. 6/6; O.S. 6/5— with correction.

Ophthalmoscopic examination showed definite increase in the sclerosis of the retinal arteries. Attenuation with increase in light reflex and definite arterio-venous compression were present.

An attempt to precipitate an attack of blindness was unsuccessful, there being no change in the appearance of the arteries. The general physical examination showed no change. The blood pressure was 118/85.

Except for abdominal pain, the patient continued to be in good health with no return of ocular symptoms for sixteen months. He died July 4, 1939, in St. Louis City Hospital following a cholecystectomy.

Comment

Similar cases usually have been reported in the literature as spasm of the central artery, the role of spasm being assumed rather than proved. Some authors consider permanent occlusions to be on a spastic basis, and the term is also used in hypertensive retinal disease. As the fundus picture in this case seems identical with that of permanent occlusion or embolism of the central artery, the term intermittent occlusion of the central artery seems not only more accurate but less confusing than spasm of the central artery. The present case seems quite typical, being very similar to the quoted cases from the literature.

An attempt to photograph an attack was successful, an excellent series being obtained that gives a very satisfactory idea of the appearance of the fundus before, during, and immediately after an occlusion. Figure 1 is a photograph of the left fundus, showing it to be essentially normal. The arterial changes are so slight as to be unrecognizable in the photograph and barely noted with the ophthalmoscope.

Figure 2 was taken a few minutes after figure 1, during an attack that was precipitated by exercise while the patient was bending over. The most striking change is in the appearance of the arteries, which are reduced to mere threads. The inferior temporal is the least affected

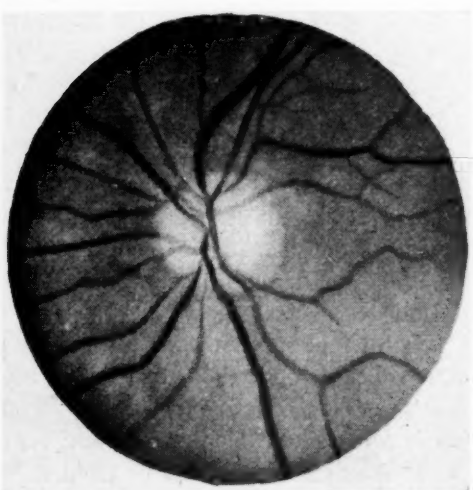

Fig. 1 (Sanders). Photograph of fundus of left eye before occlusion, showing normal appearance.

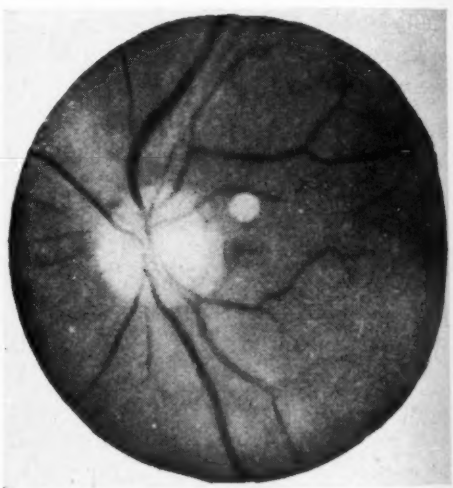

Fig. 2 (Sanders). Photograph of fundus of left eye during occlusion, showing disappearance of retinal arteries.

and can be seen in outline, but the nasal vessels, which are well seen in figure 1 seem to have disappeared entirely. There is no marked change in the veins, although in Harbridge's case there was venous occlusion also, and in Bruner's there was stasis with breaking up of the column. Although not well shown in the photograph, the disc became very pale, a change noted by all previous observers. The photographs do not show the marked changes in the appearance of the retina, which were very apparent ophthalmoscopically. Soon after the occlusion, the retina became very hazy, the appearance being similar to that seen in permanent occlusion or embolism of the central artery. This appearance disappeared so quickly after circulation was reëstablished, that it was probably due to a loss of transparency on a reversible chemical basis, as an anoxemia or a retention of metabolic products. The return of vision was not coincident with restoration of circulation, but was delayed for several seconds until the retina had had the opportunity to regain its normal state. In permanent occlusion of the central artery or embolism, the opacity of the retina is usually attributed to edema or necrosis,[15] and has been noted as soon as 15 minutes after onset of blindness.[16] As our patient regained normal function several times after occlusions lasting as long as 10 minutes, it seems probable that the haziness of the retina seen in embolism is on a reversible chemical basis, at least for some time after onset. Any treatment of embolism that could restore circulation within several hours, would probably get an excellent visual result.

Figure 3 shows the fundus after the patient had recovered vision, having been taken about 10 minutes after figure 2. The arteries and retina are now normal. The chief change is the dilation and distention of the veins.

In any occlusion of a central retinal vessel, four processes, in combination or separately, are usually responsible, these being embolism, thrombosis, endovasculitis, and spasm.[15] Verhoeff[17] in 1907 was the first to emphasize that the so-called thrombosis of the central vein was essentially an obliterative endophlebitis. In 1913 Coats[18] presented a classic account of the pathological changes occurring in

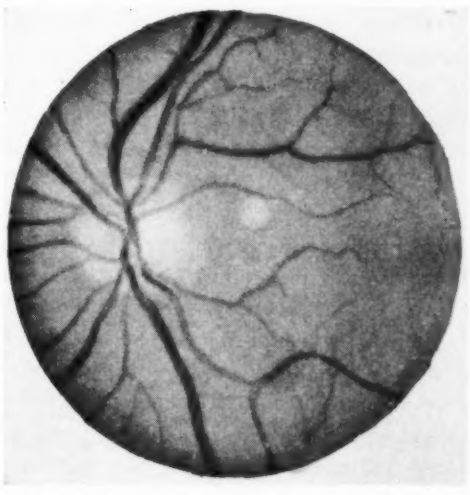

Fig. 3 (Sanders). Photograph of fundus of left eye about 10 minutes after occlusion, showing dilated retinal veins.

the central vessels of the retina, consisting primarily of an endovasculitis characterized by an endothelial proliferation. He states that it seems to be chiefly a matter of chance which finally occludes first, the almost obliterated artery or the vein, but that a few of the cases are definitely embolic in origin. Lately this view has been substantiated by Minton[19] who, after studying 54 cases, states that occlusion of the central artery very rarely (10 percent) occurs in young people, usually as a result of valvular disease of the heart, probably being true embolism, but over 90 percent occur in people over 50 years of age, as a result of slow and gradual obliterative endarteritis. Even so, the most common

term for this condition in general use today is embolism of the central artery. Coverdale[15] believes that the most satisfactory explanation of the great majority of cases of occlusion of the artery not definitely attributable to endarteritis is embolism, which may occur in the absence of any other sign of cardiovascular disease.

In evaluating the causative factors in this particular case, of the four mentioned above, embolism and thrombosis are obviously impossible, leaving only endarteritis and spasm to be considered. In this patient there is definite evidence of generalized arterial disease, as shown by the slight elevation of blood pressure, the palpable radial and dorsalis pedis arteries, the widening of the aortic shadow on fluoroscopic examination, and the slight sclerosis of the retinal arteries.

Since an attack could almost be elicited at will and since the patient was so completely coöperative, this case offered a unique opportunity to study the precipitating factors. It was first thought that the exercise caused an elevation of the intracranial pressure which was transmitted down the intervaginal space, and this closed off the central artery at the site of a localized endarteritis. This theory was disproved by the lack of response when the intracranial pressure was elevated to known high levels. The lack of effect of posture and hyperventilation were also shown by experiment. It was found that the occlusion took place when the blood pressure was elevated to around 180/100, which was most easily done by exercise. It was also noted that occlusion failed to take place after use of vasodilators, such as nitroglycerin.

Although arteriospasm seems definitely to be precipitating factor, the presence of the organic arterial disease cannot be ignored. It seems likely that the exercise causes an elevation in blood pressure with an accompanying arterial spasm. The resultant narrowing causes a complete occlusion in a central artery, whose lumen is already partially blocked by an endarteritis. The presence of the local arterial disease might act also as a localizing factor, causing that particular artery to go into spasm. A similar condition is well recognized in the heart, anginal attacks being caused by an intermittent occlusion, based on spasm, in a diseased and partially occluded coronary vessel.

In general these patients seem either to develop a permanent occlusion, which obviously results from a progressive increase in the endothelial proliferation with complete occlusion, or to recover in a short time, as our patient had attacks for only three weeks, Harbridge's for 10 days, and Bruner's for one week. Although vasodilators may aid in reducing temporarily the number and severity of the attacks, it seems doubtful that they could have much effect in producing permanent recovery. As the blood pressure of 118/85 noted at the last visit was the lowest recorded, it is possible that the the disappearance of the attacks in this patient is due to a general reduction in arterial tone and a lessened tendency to arteriospasm, because of the removal of some pressor substance. The increase in the sclerosis of the retinal vessels suggests the possibility that progressive changes in the arterial walls has made them incapable of spasm.

The treatment of this condition should not only consist of removal of precipitating factors, as exercise in this case, elimination of known vasoconstrictors as tobacco, and the use of mild vasodilators, but also should attempt to lessen the number of attacks so as to minimize the possibility of a permanent occlusion. As there is an ever-present danger that a temporary obstruction may become permanent, one should always be prepared to treat a permanent occlusion by the accepted

means; massage, paracentesis, and the use of strong vasodilators as acetylcholine.[20]

We wish to thank Dr. Dan Myers for his aid and advice in the medical examination of this patient.

Summary

1. A case of intermittent occlusion of the central retinal artery repeatedly observed ophthalmoscopically is reported.

2. Fundus photographs taken before, during, and after an attack of occlusion are discussed.

3. The causative factors of endarteritis and arterial spasm are evaluated.

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STANDARDS FOR OUT-PATIENT SERVICE IN OPHTHALMOLOGY*

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Because of the need for information concerning the proper organization and equipment for hospitals and clinics wishing to develop an out-patient service in ophthalmology, a committee of the Associated Out-Patient Clinics of New York City prepared standards for out-patient service in ophthalmology in 1923.[1] These standards have served a useful purpose not only in New York but in other cities for those wishing to develop new clinics or reorganize established departments. However, because of advances in ophthalmology and changes in clinic procedure it was deemed advisable to revise these standards. Therefore, at the request of the Welfare Council of New York City and the National Society for the Prevention of Blindness, a committee of ophthalmologists was appointed by the Section on Ophthalmology of the New York Academy of Medicine.†

A recent survey of clinics in New York[2] indicates that although there has been considerable improvement in clinic practices as compared with those reported in previous communications,[3, 4, 5] the organization of our eye clinics not only from the standpoint of professional services but also from the nursing and social-service point of view could still be improved. The nursing and social-service conditions and recommendations approved by the committee may be obtained from the Welfare Council of New York City.**

The following recommendations for medical standards for out-patient service in ophthalmology were approved and accepted by the New York Academy of Medicine on May 16, 1938.

I. ORGANIZATION OF OUT-PATIENT OPHTHALMOLOGIC DEPARTMENTS

Although eye out-patient departments as unattached eye dispensaries and ophthalmological departments in unattached general clinics are looked upon with disapproval at present, out-patient ophthalmologic departments may have to be organized in the following ways: (1) as an out-patient service of an eye hospital; (2) as an unattached eye clinic; (3) as a unit of service in the out-patient department of a general or special hospital, and (4) as a department in an unattached general clinic. Bearing in mind various types of organizations, the committee has suggested standards which may be adapted to any ophthalmologic service.

1. Administration.

a. Board of trustees. If the out-patient service is administered by the board of trustees of the hospital, a subcommittee of the board of trustees should give special attention to the out-patient department and hold regular meetings with the medical director of the out-patient department and the clinic staffs.

The medical board of the out-patient department and the eye dispensary should have a practical liaison with the board of trustees.

Close relationship should be maintained between the board of trustees, the super-

* Presented before the Section on Ophthalmology, New York Academy of Medicine, November 15, 1937.

† Committee on Standards for Out-Patient Service in Ophthalmology of the New York Academy of Medicine: Ellice M. Alger; Thomas H. Johnson; Osborn P. Perkins; Henry R. Skeel; David H. Webster; Webb W. Weeks; and Conrad Berens, chairman.

** Welfare Council of New York City, 44 East Twenty-third Street, New York, N.Y.

intendent of the hospital, the director of the out-patient department, and the chiefs of clinics through regular conferences at which problems of administration relating to the ophthalmologic service should be discussed.

b. Medical board. If the medical service of the out-patient department is administered by the medical board of the hospital, the medical staff of the out-patient department should have representatives on the medical board who should be elected annually and who should report regularly to the medical staff of the out-patient department on action taken at meetings.

If the medical service of the out-patient department is administered by an independent medical board, the ophthalmologic service should have representatives on the medical board who should be elected annually and should report regularly to the staff of the ophthalmologic service on action taken at meetings.

The medical staff should hold general conferences at least three times a year. Members of the medical staff should be required to attend these conferences. Subjects for discussion might include evaluation of service rendered, coördination of the work of the clinics, research, and allied topics.

2. Director of Out-Patient Service.

There should be regular meetings of the superintendent, the director of the out-patient department, and the chiefs of the clinics to discuss clinic and administrative problems.

3. Other Services in the Out-Patient Department.

The following services should also be available to the ophthalmologic service through other clinics of the out-patient department or by arrangements with hospitals or special medical institutions: general medicine and complete laboratory services including pathology, bacteriology, serology, and roentgenology; ear, nose, and throat; dermatology and syphilis; neurology and neurosurgery; dentistry; physiotherapy and psychotherapy; departments of research, photography, and art.

No eye clinic should function without adequate contact with general medicine, ear, nose, and throat service, and complete laboratory facilities including roentgenology.

II. Physical plan of clinic

1. Space and Arrangement.

There should be an adequate number of rooms conveniently located for patients and professional staff. Large clinics should include a clinic room for diagnosis and treatment, a dark room, refraction room, clinic operating room, hospital operating room, room for roentgenology, and rooms for physiologic optics, perimetry, and motor anomalies. All rooms and equipment should be adequately lighted.

2. *Equipment.

*Trial cases. One for two ophthalmologists engaged in refraction.

*Trial frame. One for each ophthalmologist engaged in refraction.

*Retinoscopy racks. A set for two ophthalmologists engaged in refraction.

*Retinoscopes. One for two ophthalmologists engaged in refraction.

*Ophthalmoscopes:

*Electric. One for three ophthalmologists.

*Plain. One for two ophthalmologists.

Binocular. One for entire clinic.

Tonometer. Two for each clinic. *In smaller clinics one is sufficient.

*Instruments for minor operations: eyelid everters, tongue depressor, spuds.

* Minimum.

*Sterilizer. One for clinic.
*Corneal microscope. One for clinic.
*Perimeters. One hand perimeter and one on perimeter table.
*Tangent screen. One for clinic of 10 ophthalmologists.
*Near type. One illiterate and one standard for each ophthalmologist engaged in refraction.
*Suitable test objects for perimetric and tangent-screen work.
*Color tests. Wool tests, preferably Jennings. One for clinic.
*Ishihara test. One for clinic.
*Prince rule or substitute. One for each ophthalmologist.
*Test cards for distance adequately illuminated. One illiterate and one standard. One for two ophthalmologists engaged in refraction.
*Prisms: Square. One set for two men (0.5 to 50 prism diopters).
*Arrangement for muscle testing. Light with iris diaphragm and a Maddox rod. Red diplopia glass. One for two ophthalmologists engaged in refraction.
*Tests for stereopsis. *Stereoscope with special cards for stereopsis. One of the major amblyoscopes and slides. Howard six-meter stereoscope.
*Transilluminator. One for each clinic of 10 men.
*Exophthalmometer. One for each clinic.
*One treatment table for two ophthalmologists; chair for each man.
Two surgical chairs and surgical tables (one of each for small clinic).
*Binocular loupe. One for each ophthalmologist.
*Lenses for oblique illumination and indirect ophthalmoscopy. One for each ophthalmologist.

This equipment should be conveniently arranged and some member of the administrative staff should be responsible for seeing that it is replenished and kept in good order.

3. Supplementary Services.

Every institution should have its own facilities for manufacturing lenses, or employ an optician on a full- or part-time basis to fit and make glasses, or contract with a wholesale firm to furnish materials at wholesale prices and sell the glasses to patients at the clinic. Glass should be of good quality properly ground and the frames properly fitted.

The pharmacy should be under the direction of a registered pharmacist. A standard formulary should be adopted and revised every year. It is permissible to use numbers provided *written* directions are given by the physicians. In the use of poisonous drugs it is advisable to have directions printed in several languages.

III. Admission of patients

1. Standard Admission Blank.

A standard admission blank adapted to meet the needs of the clinic should be used by all out-patient departments.

2. Responsibility for Admission of Patients.

Decision as to the admission of patients to clinics should be based on the service available to meet the medical needs of the patient and in accordance with his ability to pay. Final decision should be made by a medical admission officer who should decide whether the case is an emergency and if appropriate service is available, and to which clinic the patient should be referred. The decision concerning the patient's ability to pay should be made by the director of admissions.

3. Limitation by Age.

No children under 14 years should be

admitted to the clinic unless accompanied by an adult, except in an emergency. Agencies referring children to a clinic should be responsible for seeing that an adult accompanies them.

4. Fees.

It is desirable that stated fees be charged for refractions, perimetric examination, special examinations, treatments, and for medicines. Patients unable to pay these stated fees should be treated at reduced rates or free after careful investigations of their financial status.

5. Prevention of Overcrowding.

Only patients who are being examined should be permitted in the clinic room. Patients with a solution of drugs in their eyes or waiting for examination should remain in the waiting room.

IV. Clinic procedures

1. Routine History and Examination.

A routine method of taking the history and making the examinations should be standardized in each clinic. Wassermann tests should be made routinely in all cases in which syphilis may be an etiologic factor. Written or printed directions should be given for all treatment.

2. Revisits.

Patients making revisits should be referred if possible to the physician who examined them originally. His name should be in a conspicuous place on the record and on the folder.

3. Referring Patients to Private Physician.

Physicians on the clinic staff who are willing to have patients referred to their private offices should list their names and the maximum fee charged with the director of admissions. The list should be passed upon by the board of surgeons. Patients should be referred to the physicians on the list who are on duty the day the patient obtains such a list.

4. Records and Filing.

All clinic records should be filed in a central file. Out-patient records should be included in a unit record system. Records should be cross-indexed by diagnoses and operations. The standard nomenclature of diseases should be adopted for use in each institution. Some member of the clinic staff should be responsible for the completeness of the clinic records. A summary of the social history should be made a part of the record.

5. Statistics.

Standard forms should be used for the collection of statistics and monthly reports made from these.

6. Periodic Evaluation of Clinic Procedure.

There should be a periodic review of the type of work done in the out-patient department and an evaluation of the results. Discussion of the work of the clinic should be a regular part of clinic conferences.

7. Research and Teaching.

There should be a special department for research, for which the board of directors should see that funds are available, and every physician and student working in the clinic should be encouraged to do research. The resources of the ophthalmologic clinic should be used to a maximum in teaching practicing ophthalmologists, students, and resident physicians. The teaching should be organized preferably in relation to a medical school.

V. Medical staff

1. Chief of Ophthalmologic Service, Chief Surgeon or Director.

a. Education and training. Medical degree from a grade-A medical school, reg-

istration to practice in the state of residence, and certification by the American Board of Ophthalmology. An interest in and an understanding of the medical and social aspects of diseases of the eye should have been acquired either through courses in medical school, or in postgraduate work, or experience in working with a medical social-service department of recognized standing.

b. Selection. The selection of the chief of the ophthalmologic service, chief surgeon, or director should be made by the medical board from a list of candidates proposed by members of the staff, ophthalmologists, or upon recommendation from one of the American ophthalmological societies.

c. Tenure. The chief of service should be appointed by the board of trustees for a definite term. A retiring age of 65 should be enforced by the trustees.

d. Duties. Planning with the superintendent and the director of the out-patient department concerning space, equipment, supplies, records, relation to other clinics, and so forth.

Selecting and supervising the staff and outlining their duties.

Giving general supervision to the examination of all patients in the clinic and assuming responsibility for standards of work maintained by the staff.

Consulting with associates regarding the diagnosis and treatment of certain cases.

Approving personally or through a designated representative each patient admitted.

Assuming responsibility for the standard of all surgical work.

Holding clinic conferences at least once a month and conferences with other departments at regular intervals.

Organizing and supervising the training of associates.

2. Senior Ophthalmologic Surgeon, Junior Ophthalmologic Surgeon, Assistant Ophthalmologic Surgeon, and Clinical Assistants.

a. Education and training. Senior ophthalmologic surgeons, junior ophthalmologic surgeons, and assistant ophthalmologic surgeons should have a degree from a grade-A medical school, registration to practice in the state of residence, and certification by the American Board of Ophthalmology.

Clinical assistants should be graduates of a grade-A medical school and should be able to pass the examinations required by the hospital or clinic.

Formal courses of instruction should be arranged for the medical staff covering subjects included in the examinations of the American Board of Ophthalmology; namely, external diseases of the eye, ophthalmoscopy, anatomy and pathology, errors of refraction, motor anomalies, perimetry, relations of ocular conditions to diseases of other parts of the body, therapeutics and operations, and optics and visual physiology.

Medical schools, hospitals, and clinics offering postgraduate courses in ophthalmology should incorporate in their curricula lectures on the social significance of diseases of the eye, and the functions and practice of medical social service and follow-up in relation to eye clinics. Observation and practice in an ophthalmologic clinic having a well-organized medical social service should supplement these studies.

b. Selection. The selection of the clinical medical staff should be made upon recommendation of the chief of service with the approval of the medical board and the board of trustees.

c. Tenure. Reappointment should be made by the board of trustees on the recommendation of the chief of service and the medical board on an annual basis. Clinical assistants should be on probation

until they pass the examinations required by the hospital or clinic for advancement to the next grade.

d. Duties. The senior ophthalmologic surgeon, junior ophthalmologic surgeon, or assistant ophthalmologic surgeon should assume the duties of the chief of the ophthalmologic service during his absence.

Assistant ophthalmologic surgeons should make diagnoses, treat patients, and perform and assist in operations.

Clinical assistants should make diagnoses, treat patients, perform refractions, assist in operations, and operate under supervision.

House surgeons should aid the director or his representative in the examination and admission of patients to the hospital, assist in operations, and perform certain operations under supervision. They should be responsible to the chief of the ophthalmologic service for the care of designated out-patients.

Clinical clerks (medical students) should assist the staff in taking histories, administering minor treatments, and so on.

3. Size of Staff.

The staff should be adequate to care properly for the patients admitted in the clinics. In a clinic where all types of patients are accepted and there is available a complete staff of ophthalmologists, nurses, medical social workers, and lay assistants, each ophthalmologist may examine an average of 10 new patients, or 15 old patients, or 5 new and 10 old patients, in one hour exclusive of refractions, visual fields, and other detailed examinations. No ophthalmologist should be required to perform more than six refractions an hour.

4. Professional and Lay Assistants.

The physician should be relieved of duties not directly concerned with the professional care of patients by the delegation of such duties to trained technical assistants: executive, nursing, medical social service, and clerical.

Studies of visual acuity, and of perimetric and routine muscle examinations may be made by trained technical assistants. A medical social worker should be on duty during each clinic session.

Summary

Standards for out-patient service in ophthalmology including administration, plan and equipment, admission of patients, clinic procedures, selection, and tenure and duties of the medical staff and lay assistants have been prepared and presented in order to facilitate the development of new clinics or the reorganization of established departments.

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OPHTHALMIC SURGERY AT MISSIONS IN INDIA*

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The usual visit to India for instruction in cataract surgery consists, I am informed, of a six weeks' residence at the clinic of Sir Henry Holland or other established clinic. The appointment is made in advance and a contribution to the clinic is accepted. Instruction is given in the Smith Indian intracapsular cataract operation, after which the visitor is permitted to perform many operations.

Six years ago Dr. Watson Gailey of Bloomington, Illinois, went "on his own," having made tentative appointments to visit mission hospitals through missionary societies in the United States. He planned to return last winter and had asked Dr. Walter Stevenson of Quincy, Illinois, to go with him. When Dr. Gailey was unable to leave, Dr. Stevenson asked me to accompany him. The "cataract season" may be any time in the winter selected by the surgeons. A white person would not choose to visit India in March and during the summer when the temperature every day in Central and Southern India is 115 to 120 degrees.

Attendance at the International Congress of Ophthalmology in Cairo, Egypt, delayed our arrival at Bombay to the latter part of December. We spent a week visiting clinics, offices, and hospitals in Bombay. Most of our time was spent at the clinic of Sir Jameson Duggan at the Jee Jee Boy Hospital of the Bombay Medical School, where Dr. Duggan is the Professor of Ophthalmology. A study of his wet specimens, showing the dissection of the course of the facial nerve, was an aid in the application of block anesthesia.

Numerous cases of trachoma were treated at the dispensary. Many patients with chronic trachoma remained at the hospital two weeks for daily treatment before undergoing cataract extraction. Dr. Duggan remarked that he would perform but few cataract operations if he did not operate on patients who had had trachoma. His low incidence of infection may be due to the technique he always uses in cases of hypermature cataracts. It consists essentially in opening the capsule with the cataract knife during the corneal incision. The incision is made at the equator, with the knife emerging at the limbus above with a wide and long conjunctival flap. The lens is not punctured low, as the keratocystitomy of Gayet, nor is Erwin's flap made. Duggan punctures the lens at the lower margin of the pupil and, by drawing the point, makes a slanting incision in the capsule about 3 mm. in length. The knife then promptly continues to the opposite limbus for the completion of the incision. The anterior chamber fills quickly with the milky fluid of the pearly white hypermature lens. Copious washing with a thin pointed irrigator clears the anterior chamber. The nucleus is extracted without iridectomy by pressure with a spoon or hook. This is followed by more irrigation. The iris is replaced. The long conjunctival flap is not sutured. The eyes that I saw at the end of the week evidenced the success of this method in his hands.

The dispatch acquired by Indian surgeons from their volume of operations is illustrated by the excision of a tear sac which I saw Dr. Duggan do in three minutes. I asked him what he considered the cause for so many cataracts in India. He

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* Presented before the Chicago Ophthalmological Society, October 4, 1938.

mentioned only the bright sun.

We proceeded from Bombay direct to four missions that are off an irregular line through the Central Provinces, Berar, and Bihar, toward Calcutta. Here we were instructors rather than students (fig. 1). Our clinics were visited daily by the civil surgeons and doctors from neighboring towns. We followed in India the methods we used at home. Too frequent iritis and iris prolapse with the old extracapsular extractions had turned our attention to intracapsular operations. We had seen Colonel Smith operate but were discouraged by vitreous loss, high pupils, and much astigmatism associated with the Indian intracapsular operation. We had each, years ago, purchased a Barraquer machine and used the method many times. Hammock pupils following operation, together with care of the machine, may be included among the reasons for abandoning that method. We were both much encouraged after witnessing Professor Elschnig operate at the Illinois Eye and Ear Infirmary. Since that day we had independently followed the technique described by him and chose to do so in India. The essential feature is the use of a smooth capsule forceps to grasp and aid in freeing the lens. Sauvincan's, Graefe's or Pana's forceps described many years ago, when made smooth, or Schmidt's spoon forceps may be as effective as one of the recent models. I came to use the Arruga forceps more than any other. Occasionally when the Arruga failed, one of the other smooth forceps would take hold—more often the Arruga held when one of the others slipped. Dr. Stevenson frequently used his specially constructed fine-pointed tie forceps as a capsule forceps. Possibly it is the nice approximation rather than the size of the blades that is essential. The usual clear eyes without congestion, freedom from iritis, or prolapsed iris, prompt healing, and excellent vision with round pupil and not much astigmatism encourages me to continue with the Elschnig intracapsular method of extraction.

It should be understood that all precautions by way of examination before operation were carried out and contraindications observed. Tonometer tension was

Fig. 1 (Higgins). Native with drum and sandwich sign announcing the arrival of two American ophthalmic surgeons.

taken when suggested by the digital method. Only two cases presenting unusual risks were accepted. The results were fortunate. One was extraction of cataract in a patient shaking with paralysis agitans and another with tension of 50 mm. Hg. In the latter case, the man had some vision in the other eye. Leavoglaucosan was used to reduce the tension.

When patients off dusty roads, who have never used soap, are accepted, one may expect complications. Unexplained infections as we see them here were scarcely more frequent in India. Dr. Stevenson used intramuscular injections of milk immediately after operation in a series of cases. After I had had two infections when using the Duggan conjunctival flap

in 24 patients with trachoma, I abandoned that technique. Either my preliminary treatment was not effective or the diagnosis of healed trachoma not accurate. After seeing the infected cases I bandaged trachoma eyes over night. A thin yellow secretion was present next morning in some eyes and not in others. I felt it might be safe to operate on the eyes without secretion, but that was after the experience and I did not operate.

Hypermature lenses are removed nicely with smooth capsule forceps. Occasionally the capsule would break as the lens was emerging through the incision. The capsule could be easily removed with a capsule forceps or often better with the tie forceps. Prolapsed iris was rare. Homatropine was used before the operation. Eserine ointment was placed between the lids after Elschnig extractions. Vitreous did at times present, but not in amount nor frequency seen with other techniques. There were three cases of explosive hemorrhage—digital tension normal. The first was mine, occurring in a man as soon as he reached his bed. One occurred two days after operation. (We should have stopped operating at an even number.) The third took place immediately after the incision and was complete on the operating table. It was on the 1,059th eye. The patient's other eye was not operated on.

We followed the custom in India of operating on both eyes at one sitting. In the last mission we made the incision in the patient's left eye with the left hand. The experiences encountered with one eye were always repeated in the second eye—jumpy patient, failure to look down, fragile conjunctiva, hemorrhage in anterior chamber, contracting pupil, or presenting vitreous, and so forth. When the operation did not proceed as smoothly as desired on the first eye, I deferred operation on the other eye.

We used pontocaine in a series of cases but returned to 5-percent cocaine drops for local anesthesia. The O'Brien injection of the facial nerve was made in all cases. The patient usually responds when hard bone is encountered. The needle is inserted anterior to the incisura intertragica. Properly executed one and not more than two cubic centimeters of novocaine is sufficient. The O'Brien injection may be supplemented by the Van Lint method. A long needle is necessary to place the novocaine at and beyond the superior and inferior orbital notches. We usually placed a bridle suture beneath the tendon of the superior rectus muscle. No novocaine was injected in the muscle.

Retrobulbar injections were made in all the intracapsular extractions. The needle was inserted, as we saw Elschnig do it, through the lower lid. It is worthy of note that in over 1,000 extractions there was no complication, infection, swelling, or other undesirable sequela due to the injections of novocaine. In one of my cases a hemorrhage immediately followed the retrobulbar injection. The needle may have been too long. The cataract was removed by me a week later with good surgical and visual results—usual technique including retrobulbar injection. Delay in making the incision after retrobulbar injection accounted for five lenses dropping into the vitreous. Prompt use of Reisinger forceps or the loop rescued them.

We preferred to make a small peripheral iridectomy to Elschnig's iridotomy incision. For this purpose we purchased very fine iridectomy forceps from Weiss in Cairo to supplement the forceps we brought with us. No matter how tiny a bit of iris was excised, the opening was always large enough.

Dr. Stevenson preferred conjunctival sutures. He said his became untied or pulled out of the conjunctiva after a week or so. When I knew I would remain for

a week after the operation to remove it, I continued using in all cases the mattress corneal scleral suture that I described to this Society in 1931. In no case was there a complication, infection, or other unfavorable result from the fine silk thread in the cornea.

The total number of miscellaneous operations we performed at the four missions nearly reached the figure for cataract extractions. These included operations for glaucoma, squint, trachoma, pterygium, pannus, tumors, entropion, ectropion, as well as excision of tear sac, many optical iridectomies, some plastic operations, and, of least number, enucleations. Refraction of 100 girls between the ages of 7 and 20, at a Methodist school, brought in five squint operations. The errors of refraction in these Indian young people were of the same variety we see here and in about the same proportion. I was surprised to meet many cases of usual and a few of high myopia among adults about the missions and in the towns.

The natives came for help when blind and at the end or height of inflammatory conditions rather than for early or preventive treatments. Prince's trachoma prescription of glycerine and copper solution was frequently prescribed for home use. Patients receiving a zinc collyrium for conjunctival congestion frequently returned with the request for the stronger eye drops. The simple natives welcomed the magic of the needle. This observation was confirmed by mission doctors, who told me they could induce patients to return for specific treatment by injections who would not continue with oral or dermal remedies at home.

We rode a day and a night from Asansol near Calcutta to Lahore in Northern India in compliance with Gailey's admonition to witness the incision and dexterity of Dr. Mathra Das. His incision is very broad at the very juncture of the cornea and sclera, but within the cornea, although it always emerges through the cornea 1 to 1½ millimeters from the margin. While making the incision his spring-type (the Clark or Jullundur) speculum is raised and steadied by his trained assistant, who is neither a doctor nor nurse. The speculum is removed after the incision is made. From here on the assistant separates the lids as may be required with his fingers. A small iridectomy of the sphincter at the pupillary margin is made with ordinary iris forceps and curved scissors. The lens is pressed out with no exaggerated motion. The pressure of the hook when first applied may be directed toward the optic disc, but the motion that I saw was upward—a quick even upward wiping out of the tumbled lens. The iris is quickly replaced. A drop of atropine solution and a bit of yellow oxide of mercury ointment precedes the application of the eye pad. Both eyes are bandaged; binocular operations are usual. There is no nerve-blocking type of akinesia nor suturing of lids or conjunctiva. Anesthesia is afforded by repeated dropping of 5-percent cocaine. Liberal washing with 1 to 5,000 bichloride solution immediately precedes the insertion of the speculum. The lids and face may or may not be stained with a weak iodine solution. The irrigation solution need not be dried from the face, neck, or ears. Counting the time from the beginning of the incision, after the eye is held by fixation forceps, to the moment when the iris has been replaced, the total time for Dr. Das to extract a cataract in the usual uncomplicated case is 50 seconds. During the past 35 years Mathra Das's total cataract operations up to the end of 1937 number 141,936. The largest number that he has done in one day was at a special clinic some miles from Lahore where he began operating at seven in the morning and

continued straight through until one o'clock at night. When he had operated on the last patient, the total for the day was 707 cataract extractions. This last figure was told to us by Dr. Das and the assistant who was with him. I quote the total number of operations from the printed "Statement showing the number of selected operations performed by R. B. Dr. Mathra Das Pahwa during the last 35 years" given to me by Dr. Das himself. I found no one familiar with Das's work who doubted the accuracy of these figures.

The number of cataract operations is less than half of the "total of selected operations each year." The grand total of all operations for the 35 years is 200,757. This total includes cataracts, iridectomies, rhinoplasty, hare lip, obstetric, tumors, bones, joints, and the operations we list in general surgery. Our urologists may be interested to know the list includes 87 prostatectomies, 62 external urethrotomies, and 1,137 operations for stone, which I assume to be of the urinary tract. Many may be surprised that Dr. Das's list of operations near the city of Lahore in Northern India near Kashmir does not include the words goiter nor thyroid gland. For the edification of our nose and throat associates, I can say that tonsillectomies are conspicuous by their absence. The list does not mention tonsils nor tonsillectomies.

The results I saw of Dr. Das's operations were surprisingly good. The eyes I saw were not inspected before the fourth day. The scleras were moderately clear. They did not show the congestion and iritis so often present with the older extracapsular operations when portions of capsules or lens were left in the anterior chamber. Many cases I saw showed hammock pupils, which I believe is inherent with the Indian intracapsular operation. No surgeon anywhere can continue performing many cataract operations unless visual results are usually satisfactory to his patients.

Under the assumption that visual requirements are not so exacting by patients in rural India as they are in the United States, and that the number of operations a surgeon could perform in one day by more elaborate technique would be markedly curtailed, I admit that the Indian operation may be the choice for India.

Dr. Das's cataract patients are permitted to sit up in bed after 12 hours. On the third day they may sit in an easy chair in the same room. On making rounds at his large free clinic, called the Emerson Eye Hospital, which he supports with his own money, I did not observe patients taking the liberties his printed directions permitted. Regarding spectacles his printed instructions read "(a) Patient must use spectacles after operation, otherwise he will not have good vision. (b) Spectacles are to be used 2½ months after operation when the eye is entirely free from redness."

One day, after daily attendance of four or five days, Dr. Das demonstrated his technique by having us rest our hand in his while making the incision. When we held the hook his hand directed pressure and escape of the lens. One of his doctors recorded our names in the daily "log book" as assistants in those operations. This was after we had together completed our list of over 1,000 cataract operations at the missions. On another occasion, after completing a dozen or more cataract operations he ended the surgery of the morning by doing as neat and clean a hernia operation as I have ever seen, on a boy under chloroform anesthesia. He invited us to accompany him to a special clinic to be held in two weeks. I was led to believe that we might do some operating there. An ophthalmologist from Port

Said, Egypt, visited Mathra Das while we were there. He left after three days telling us that he wished to go where he would be permitted to operate rather than observe. His home was formerly in Germany where he was well trained.

While riding with Dr. Das in his car, making house calls and going past the beautiful Shalimar gardens to his Emerson Eye Hospital, he good naturedly submitted to the innumerable questions of two American doctors. It seemed to us that his charm and smile were rivaled by only one contemporary in the world today. He told us that he asked the Institute of Tropical Diseases in Calcutta to conduct researches to determine the cause of cataracts. They did not comply with his request. He then leisurely reviewed what he has considered clinically to be the cause of senile cataracts in India. First and foremost was the bright sun. The rural inhabitants are not protected by wearing hats or visors nor do they wear dark glasses. Most of the days of the year are without clouds or shade. Next in importance he mentioned errors of refraction. He has great difficulty in getting his patients to wear glasses, especially, as he said, the ladies. He admitted that intercurrent diseases and restricted diet might be etiologic causes. He disregarded the suggestion that early maturity and early senility were factors.

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PERIRRHAPHY IN THE TREATMENT OF CORNEAL ULCERS AND OPACITIES AND OF INTERSTITIAL KERATITIS

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At the Congress of the Italian Ophthalmic Society held at Rome in October, 1937, I reported a new operation, perirrhaphy, which I had used in many cases of corneal pannus due to trachoma, of ulcers, of kerato-hypopyon, of corneal opacities, and of interstitial keratitis.[1]

In the present report I shall not deal with the results obtained by perirrhaphy in the treatment of the keratitis of trachomatous pannus (the results in later cases of which confirm those already published), but shall examine particularly those obtained in the treatment of other corneal lesions.

The technique of perirrhaphy is the following: After the usual operative preparation, anesthesia is obtained by instillation. A blepharostat is applied and fixation with forceps, to steady the globe. At 3 millimeters from the cornea in the external sector (at the 9-o'clock position in the right eye, and at the 3-o'clock position in the left), a needle armed with no. 3 silk is carried completely around the cornea, using a long suture, usually 5 to 7 mm., from point to point, to form an episcleral ring. The ends of the thread are left long, 5 cm., and are carried out at the external corner of the eye—the suture begins in the right eye at the 9-o'clock position and in the left eye at the 3 o'clock position—and are fixed with adhesive to the skin.

Atropine and dionin ointment, or one of xeroform-optochin, is applied. The monocular bandage should be renewed until fluorescein stains the ulcerous surface; the patient should wear a dark lens to protect the eye.

Forty-six corneal ulcers have been operated on according to this method, 34 of which were trachomatous (18 with a slight pannus) and 12 nontrachomatous; and 11 corneal ulcers with hypopyon (7 trachomatous and 4 nontrachomatous).

Postoperative treatment was as follows: Six to eight hours after the operation, when the bandage is changed for the first time, an intensive hyperemia is noted at the bulbar conjunctiva, with more or less extension of the hyperemia and edema of the palpebral conjunctiva. After the conjunctival fornices have been carefully irrigated with sterilized water, warm poultices are applied for 10 minutes and then antikeratitic ointment of atropin-dionin-xeroform and optochin is applied. The poultices and application of ointment are made three to four times a day until the ulcer is perfectly clean. Each morning the silk thread is moved to activate the hyperemia.

The results in cases of simple ulcer after operation by perirrhaphy when considered from the anatomic semiologic standpoint fall into two groups: Group 1, trachomatous and nontrachomatous ulcers that are limited to the epithelial layer, to Bowman's membrane, and to the most superficial portion of the corneal parenchyma. In cases of superficial ulcer, perirrhaphy acts immediately, and after two to four hours the pain—if there are no iritic complications—diminishes markedly; after eight to ten hours it has completely disappeared. The ulcerated zone appears on the next day to be undergoing repair, and in the small ulcers presents only some points that stain with fluorescein. It is certain that the progress of the ulcer—both superficial and deep—is

immediately arrested by the operation. After three to four days the ulcer is perfectly clean.

Perirrhaphy used in 26 such cases was followed in every instance with the described postoperative course; in two cases there was healing on the seventh day; one became exacerbated and required galvano-cautery.

In the second group are included ulcers that have infiltrated into the deeper layers of the cornea. Nine of these were operated upon: four healed promptly, two healed very slowly, and the cornea was lustrous only after 16 days; and three became aggravated and had to be extensively cauterized.

From the reports of patients, it is learned that the ulcers that were localized outside the corneal zone affected with trachomatous pannus recovered faster together with the pannus.

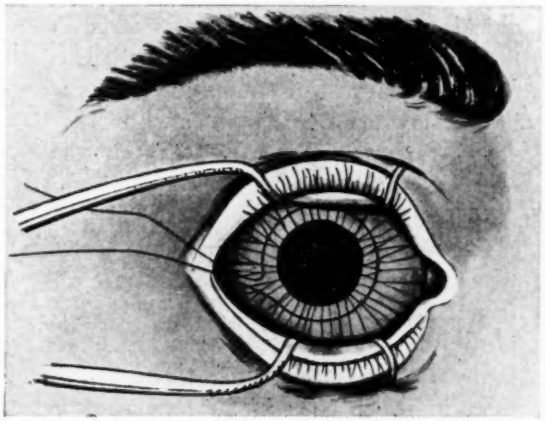

Fig. 1 (Moretti). Episcleral ring of sutures.

Corneal ulcers with hypopyon show very encouraging results. In these cases attention must be given to the lacrimal passages; in cases of chronic dacryocystitis, dacryocystectomy is performed together with the perirrhaphy, or the dacryocystorhinostomy of De Lieto Vollero[2] or Nichelatti.[3] These in many cases have been attended with excellent results.

Ulcers with hypopyon are also to be divided into the same two groups as are the cases of simple ulcer; namely, the superficial and the profound. In the first group the pain diminished after eight to nine hours and disappeared within 18 to 20 hours. The progress of the ulcer was immediately arrested, and usually after four to six days the ulcer had healed completely and the hypopyon had disappeared. Of six cases in this group, four recovered in the described manner; one after 11 days, but even in this case the progress of the ulcer was arrested immediately after the operation. One case, however, healed only superficially while the deep infiltration progressed intensively, so that galvano-cautery was indicated.

In cases of the second group, in which the ulcers were large and deep and the hypopyon high, perirrhaphy brought about a diminution of the pain, but did not succeed in healing the ulcer. Of five cases, only one recovered, after 22 days.

In such cases a reserved prognosis was made at the first examination, for the corneal destruction had already progressed extensively on the surface and into the deeper layers of the cornea. These patients had no relief from perirrhaphy, with one exception. After 24 hours they required electro-cautery and protein therapy (caseal-calcium). But in some patients even in spite of perforating electrotherapy the process was not controlled.

The worst cases of keratitis hypopyon were found in mowers' keratitis.

It is very important to note that the iritis and iridocyclitis that accompanied the different types of ulcers and that are caused by the toxic products of the organisms infecting the ulceration, were improved by perirrhaphy.

In order to understand the real efficacy

of perirrhaphy in the treatment of corneal ulcers, clinical investigations were made to obtain controls. Certain patients with simple superficial ulcers were treated with perirrhaphy and the described medical course; others, with the same clinical symptoms, were treated only medically. The former recovered from the ulcer quickly, as has already been described in this type of ulcer. But in the latter, treated only with medicaments, the ulcer healed slowly and often extended dangerously, threatening the integrity of the eye.

In some patients, treated without success with ointments and protein therapy, we observed that perirrhaphy at once effected improvement. These facts clearly prove that the effectual agent is perirrhapy. It is superfluous to say that in the cases in which perirrhaphy succeeded in healing the simple corneal ulcers or those with hypopyon, the remaining opacity was not dense and was definitely limited to the ulcerous zone, a result difficult to obtain with electrocautery at a temperature controlled to avoid great destruction of corneal tissue.

In order to obtain partial or total transparency of corneal opacities resulting from ulcers, we found that it is well to leave the thread of silk *in situ* for three weeks after the ulcer has healed.

As a basis for these observations perirrhaphy was performed on 63 patients with corneal opacities, 46 of whom had recent opacities from ulcers operated on in the manner described, and 17 with ulcers more or less old. The operative technique was always the same; only the postoperative treatment was modified in the following manner: In the morning, at noon, and in the evening warm moist poultices were applied for 10 minutes. In the morning the thread was shifted slightly and an instillation of 10-percent dionin was made after application of the poultices; in the evening, at bedtime, ointment with 1- to 3-percent yellow oxide of mercury was used.

In the 46 patients operated upon just when ulceration took place, this medical procedure was applied only for two to three days after complete recovery from the ulcer. Upon examining these patients it was found that the more or less brilliant success of perirrhaphy was in direct relation to the extent, thickness, density, and age of the opacity and the age of the patient; facts which determine any medical treatment of corneal opacities. Perirrhaphy accentuates the benefits obtained from the only medical therapy that is effective—warm, moist poultices, and dionin or thiosinamine and yellow mercury oxide—so that in cases where this therapy was ineffectual or only partially so, the surgical intervention succeeded in bringing about partial results in the first and very good results in the second group.

Upon examining the cases in which operation had taken place, we find some modification was obtained in the case of two large adherent leucomas. In three cases of dense, old, large leucomas covering the whole corneal surface, there was found partial clearing of a band, 2 mm. wide, along the limbus that had been practically useless for vision; in three other cases—one of these in an 18-year-old subject—this band was perfectly clear and larger so that an optic iridectomy could be performed, with increase of vision from 1/10 to 3/10 within four months. The other eye of this patient presented a violent irido-corneal staphyloma.

In 20 of the 26 cases of superficial ulcers operated on at the beginning of ulceration, we obtained a remarkable clearing of the opacity, and vision was reduced only slightly in close relation to the more or less central localization of the opacity. In four patients the reëstablished vision was nearly 3/10, while in one patient, for

whom cauterization was also used, vision was only 2/10. In seven cases of superficial old corneal opacities, four cleared up well, two only partially, and one not at all.

In 10 cases with a remaining opacity of the cornea after ulcers had been operated upon with perirrhaphy, five cleared up well, four moderately, and one not at all. Of six cases with remaining corneal opacity after superficial ulcers with hypopyon had been operated upon at the time of ulceration, three healed well and three, because of the central situation of the lesion, suffered diminution of vision from 4/10 to 2/10. Of five cases of leucoma caused by severe keratohypopyon, operation with perirrhaphy brought healing up to a certain point in two, as well as in those in which electrocauterization was used. Another group of 10 patients with dense profound old opacities showed the following results: Six showed slight improvement and in four there was an initial clearing up to the limits of the leucoma. In all these cases the silk was left *in situ* for 24 days, according to the density of the corneal opacities.

In five cases of keratitis parenchymatosa we observed a good result from perirrhaphy. In three cases there was interstitial heredo-luetic keratitis, one in a 12-year-old and another in a 14-year-old girl, and a third in an 18-year-old male. The clinical observation showed the usual state of parenchymatous keratitis in the stage of vacuolization: One patient had suffered for eight months; another for six; and a young man also for six months. The manifestation was localized in one eye, and in every case special treatment had been given from the beginning of the disease. The day after perirrhaphy had been performed the cornea was seen to have the color of red meat; this continued for nearly a month. A fortnight after the operation it was observed that the density had become less intensive in the infiltration, especially at the limbus and near the newly formed vessels; a fact that became gradually more noticeable, as regards both the extent of the lesion and also its depth. After a month's time had elapsed the patient could be considered clinically healed. The two girls recovered; the younger one in 45 days, the other in 54.

The silk thread was left *in situ* in the young man for 32 days and in the girls for two months. After perirrhaphy, energetic antiluetic therapy was given together with the local treatment of poultices, dionin, and atropine and yellow mercury oxide. There were no complications after the operation, but in the two patients in whom the silk thread remained two months we saw an ulcer of the conjunctiva which covered the thread. The laceration of the mucosa was not large, however, and caused no trouble.

Of the two other patients with bilateral interstitial keratitis of probably mixed tuberculous and heredo-luetic etiology, one was a young man aged 18 years who had for three years made the rounds of specialists and had taken only a few bismuth treatments. He came to our clinic as a blind patient, for the corneas were invaded by a thick scar of connective tissue furrowed by a few deeply lying thin vessels; typical of the most severe results of organized interstitial keratitis. All the usual therapy was used, including antiluetic treatment with iodine and calcium, but after 10 months of futile endeavor, perirrhaphy was undertaken. The two eyes were operated on one month apart, and we observed no immediate change in the color of the cornea. After 14 days a small strip began to clear, near the limbus and in the central sector of the cornea, so that the patient was able to distinguish something when the pupils

were dilated with atropine. The patient did not return after the silk thread had been removed—as in all the patients with keratitis parenchymatosa—one month after operation. None of the patients presented any complications; the bandage was taken off three days after the operation and the patients wore dark glasses for protection.

It is apparent that the results obtained with perirrhaphy in corneal ulcers, kerato-hypopyon, corneal opacities, and in interstitial keratitis, are due entirely to the hyperemia induced. The silk thread left in the episcleral tissue produces, like a foreign body, an intense mechanical irritation which causes the hyperemia of all the circulation in the anterior segment of the eye. As a result the nutritive metabolism becomes very active in the cornea and arms it with an increasing resistance, augmenting the phagocytic elements that protect it. Perirrhaphy is thus a means of obtaining intensely and for a sufficient duration the objective of the various medical means. Therapy with poultices, dionin, and massage of the cornea with yellow mercury oxide—are not these provocative measures? Hence the operation alone is new, whereas the medical therapy has always had the same objective; namely, to increase all the defensive mechanism of the corneal membrane.

Perirrhaphy is recommended in the therapy of trachomatous corneal pannus, corneal ulcers, kerato-hypopyon, corneal opacities, and parenchymatous keratitis.

Via Vittorio Emanuele, 460.

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[3] Nichelatti. Atti Congresso Soc. Oft. Ital., 1937, p. 471.

INHIBITIONS OF THE AUTONOMIC NERVOUS SYSTEM BY EYE STRESS*

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A freight train on a Southern railroad was held up by a beetle which got between the contact points in the block system. The autonomic nervous system consists of the sympathetic nervous system and its ganglionic plexuses, plus the pneumogastric and some other branches from the cerebrospinal system. From these go fibers to all vital organs. To function freely, the neural currents or impulses that activate the vital machinery must have unobstructed transmission.

Varied disorders of the human system have their origin in disturbances of the autonomic nervous system, originating in eye stress. The ciliary muscle, concerned in focusing the eye, is a station in this important system. Stressed vision brings on such disorders as are to be here considered. We may see in illiterates as violent upsets as in professional scholars or university graduates. While most of these patients have ocular discomfort, the general somatic symptoms occur as often when there is neither deficiency nor discomfort in vision. In a practice in one community the same patients have been under observation for many years, with opportunity to observe in some families similar manifestations in the offspring. Likewise it shows instances of those who, in early life, rejected relief for their eyes, to spend years in a futile effort to find health by medicine, surgery, and "pathies"—only to be cured in later life by the help they had formerly refused.

Seventy years ago some Philadelphia doctors began to report the cure of headaches and other nervous symptoms by relief of "eye-strain" (eye stress is to be preferred). Later Dr. George M. Gould published five volumes of Biographic Clinics, showing how famous students, writers, and musicians, had gone through life suffering from such symptoms without relief. Many think glasses that give sharp vision are all that is needed. But with perfect vision there may be eye stress. Complex instruments and quick work may get results close to the accurate correction; but inexact correction giving sharp vision, without removing the eye stress, makes the patient worse. As Lord Horder has said, "When the machine is larger than the man, the patient suffers."

It has been claimed that with a high spherical error low astigmatism need not be corrected, because looking through a strong lens obliquely will cause, or correct, an astigmatic defect; that, "weak cylinders are seldom of much use when combined with high spheres." They may be of no importance in securing acuity of vision, but are of all importance in securing relief of somatic symptoms. People who are subject to these reflexes give proof of the importance of exact corrections. Theoretical proofs that things "cannot be" must give way to material evidence that they are.

Cases

Case 1. Dr. S., aged 48 years, came on August 11, 1932, for discomfort in the use of his eyes. He had worn glasses for over 30 years. His heart action was irregular; as a medical student he had been told by his professor that he had a weak heart and would always have to live carefully. He was rejected for life insurance

* Abstract of a paper read before American Association for the Advancement of Science, Section on Medical Sciences, December, 1937.

for the same reason. He easily became tired and winded. He was also timid and unassertive, nervous, depressed, subject to insomnia, with much dreaming. He would wake startled, with rapid breathing. One eye was amblyopic; the other had a large sphero-cylindric error, with the cylinder axis at 90 degrees The proper angle was found to be 105 degrees, but no sharpening of sight was made in that eye. In October he reported relief from local and head symptoms, and betterment in other ways; heart regular. A year later he had a new air of assertiveness and self reliance. His wife said he was a transformed man. He had ceased to have fainting spells, which had been frequent for years. Examination in August, 1935, showed that he held all gains, and had added a good many pounds to weight. In April, 1937, he was still free from all old symptoms; lived absolutely unrestricted as to what might concern his heart.

Others, who habitually had taken tablets, or digitalis, found themselves able to dispense with these, and return to normal life. Some attributed their former disabilities to overweight. A woman of giantess proportions, with many stereotyped symptoms, wrote: "I know I am no lighter on the scales, but I am very much lighter on my feet."

Case 2. G. W., an athletically built boy of 13 years, was referred by his physician because of eye discomforts, headaches, and sick headaches. He was nervous, easily became tired and winded, had gassing stomach, with chest pains, and a pulse of 110. After exact correction, under cycloplegia, of errors that did not impair vision, he rapidly threw off all his symptoms. After several years he returned because of recurrence of fatigue, dizziness, indigestion, poor sleep, and loss of weight. Changes of refraction that had taken place were corrected, and he soon picked up in feelings and performance. Six months later his mother reported: "He is a transformed person. Has gained 15 pounds; from being gloomy became lively. Works hard and pulse is regular at 75." In March, 1937, he returned with the same symptoms as before: apathy, shortness of breath, rapid pulse, loss of weight, excessive perspiration. Slight changes in strength and cylinder axis were made, and 10 weeks later he wrote: "If it were not for optics, I am sure our family would be a sorry bunch."

Case 3. J. W., brother of the patient described in case 2, aged 18 years, delicate build, came for eye symptoms, headaches, and neck and shoulder pain. He was dizzy, depressed, became easily tired and winded. After a proper refractive correction he was well for over two years. Then, following a throat infection and long hours of clerical work, the old symptoms returned. A slight change in his cylinders made no change in his vision, but after five weeks he wrote: "Since I received the new glasses I have improved greatly, both physically and mentally and have gained 7½ pounds. Our family has an epidemic of eye trouble, and we all realize that without our glasses we would be physical wrecks."

Disturbances of the gastro-hepatic system, by interference with their autonomic nerve regulation, constitute a large segment of human ills, both somatic and psychic. A syndicated description of functional heart disorders ends with patients waking up with rapid breathing and heart action, and fear of impending death; then, in some cases, sending for the doctor in haste; in others, sending for all the doctors in haste. Numbers of them scream or cry in sleep, awakening not only roommates but the entire household. A middle-aged woman recently said that when staying away from home she warned her hosts not to pay any attention to shrieks coming from her by which they

might be awakened. It is common to find the appendix and gall bladder have been removed, not only failing to cure, but making the symptoms worse. It is established that where eye stress is disturbing the autonomic nervous system, any surgical, traumatic, medical, or emotional stress will aggravate the symptoms. The frequency with which certain surgical diseases can be mimicked by eye stress, especially as regards the liver and gall bladder, is remarkable. The concurrent symptoms which cannot be explained as due to liver or gall bladder, are clearly explained by a perverted autonomic nervous system.

Case 4. Mr. B., aged 57 years, came in November, 1935, for common local eye complaints. His appendix had been removed 20 years before. He had the following symptoms: Neck and shoulder pain going over ears to forehead. He was depressed, apprehensive, and easily became tired and winded. He had had bad gassing of the stomach for 20 years, with palpitation, often preventing sleep entirely. He would waken startled, sometimes sitting upright, with rapid breathing, and afraid to go back to sleep; talked in his sleep, occasionally screamed, and his feet and ankles were cold. Most of the symptoms for which he had his appendix removed continued to recur. He was wearing bifocals, which gave perfect vision for distance and near. Careful tests showed a very small difference in angles and strength of weak cylinders, but gave no sharper sight. After 18 months an acquaintance who knew him well said: "He is greatly improved in health and looks." In September, 1937, he was in better health than for 15 years, had gained over 10 pounds in weight and acquired a ruddy color, entirely changing his looks.

Case 5. Miss H., aged 58 years, stenographer, a resolute, well-poised woman, in perfect health, began early in April, 1935, to run down in health. Given a furlough she went to her distant home in another state. Much of her time was spent resting in bed, under medical supervision. Her weight fell from 180 to 150 pounds. Her pulse was very rapid, with nervousness and weakness in proportion. Being compelled to resume work, she came to get better glasses in October. Her eyes were prominent and staring. She was weak to exhaustion, pulse 125, sometimes regular, sometimes intermittent. She had tremor of the hands and suffered from drenching sweats. A young physician who had seen much thyroid surgery, agreed that by accepted standards it was a case for such surgery, so serious as to demand a two-stage operation. She was wearing minus spherical bifocals which gave good vision far and near. Under careful testing a small astigmatism was found, with the large spherical errors. The correction was of no consequence to vision, but within a month she began to look and feel better, and in three months her improvement was evident to all her acquaintances. At the end of a year the pulse continued slightly fast, but regular, and nothing was left of the thyroid explosion, except a memory. A half year later the pulse was normal in rate.

Cold feet, or cold and sweaty feet, are common from autonomic imbalance, and one of the last symptoms to disappear. A widow coming back many years for reëxamination, when asked about her former symptoms laughed and said: "Well, I know I got rid of those icy, icy cold feet."

Case 6. Another widow, with children out of proportion to her resources, had large astigmatic, myopic errors, corrected by glasses. She easily became tired, had many headaches, severe dizziness, car sickness with vomiting, gassing stomach, icy feet, and a bad heart for which she was under treatment by a physician. A

new correction put things right again for several years. The one notation after 15 years from the beginning is: "Past year gradual return of most local and general symptoms, except cold feet." Recorrection made her comfortable again.

Case 7. Mr. H., aged 45 years, strong and robust looking, was too weak and easily exhausted to work at any job. In spite of his having strong spherical lenses fitted by an oculist, he had been unable to do any night reading for five years, and suffered almost constant headache and nausea. He would waken startled, with rapid breathing, much dreaming; talked in his sleep, sometimes screamed. He had an inward nervousness; hands and feet and arm-pits sweat in the coldest weather. A very small astigmatism in one eye and moderately small in the other were found with strong sphericals. In a few months he regained his health, went back to work, and supported his family.

Case 8. Mrs. T., aged 24 years, came for local discomforts, and among her general symptoms sick headaches, dizziness, hands and feet always wet. She was wearing weak, plus spherical lenses. A small astigmatism was found in one eye and a trifle more in the other. Wearing of her correction caused all her symptoms to vanish for 11 years; then old symptoms returned, with a neck pain going over ear to forehead, sweating over the body, worse in arm-pits, groins, and flexures of knees. A slight shift in the axis of the cylinders gave her total relief of all symtoms, including the sweating. This was her condition after 16 months. A case reported by Braeucker is cited, in which the secretion of the sweat glands could be arrested in the region affected by injection of novocaine in the brachial plexus. While making no claims as to treatment of epilepsy, it has fallen to the writer to have several confirmed epileptics get and remain well for years of typical epileptic attacks which had been frequent before.

Case 9. Mrs. F., aged 43 years, did not wear her eye correction, fitted 20 years before, because she thought a mistake had been made in them. She suffered severe headaches, dizziness, constant fatigue, depression of spirits, cold hands and feet. After many surgical experiences, including removal of the appendix, one ovary, uterus, gall bladder, and at intervals teeth, the sources of eye stress were patiently sought and corrected. At the end of two months an improvement in looks was evident to her family and friends. Seen after seven months, she "looks better and younger," and a few weeks later, "bubbling over with buoyant health."

The layman can only conceive of glasses as something to make vision clear, not as something to influence bodily function for the better, even though for a time obscuring rather than clearing things viewed. Putting the idea across with the patient that his body is being treated, and that judgment is to be based on results obtained, and not upon how clearly he sees at a distance, is well nigh impossible, unless the physician aids the ophthalmologist in making the patient persist in the use of glasses that do not meet his conception of what things should be.

7 South George Street.

OCULOGLANDULAR DISEASES WITH SPECIAL REFERENCE TO TULAREMIA AND PARINAUD'S CONJUNCTIVITIS*

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In the last eight years I have had the opportunity to see 23 cases of oculoglandular disease in my practice, and it has been suggested to me that a brief description of the series would have interest, especially since in several of the cases colleagues whose ability in these lines is well known have generously helped out my own deficiencies of experience and resources for pathologic and bacteriologic study. Nineteen of these cases were briefly reviewed in a previous report.[1]

In all of the cases of my series there was a more or less generalized conjunctivitis and a vegetative growth springing from the conjunctiva combined with swelling of one or more of the regional lymphatic glands. This association of symptoms was first definitely called to the attention of the medical world by Parinaud in a description of three cases, published in 1889, and has since gone by his name, as Parinaud's conjunctivitis. The oculoglandular syndrome is now regarded as unusual but not extremely rare. My own experience leads me to believe that it is of more common occurrence than the literature on the subject would lead one to suppose. It is usually a mild disease with spontaneous, though delayed, healing and no sequelae, and it seems probable that many cases run their course without ever having been recognized as such. Other than removal of the large vegetative growths, treatment does not seem to alter the course of the disease.

The clinical picture described by Parinaud is clear-cut and it is remarkable that in half a century little has been added to it nor has it been otherwise altered. For a description in words one cannot do better than to turn to Parinaud himself. Somewhat shortened, his description is as follows:[2] "The conjunctiva is the seat of red or yellow vegetations, semitransparent at the beginning, opaque at a later stage, which can reach the size of a large pinhead. Alongside of these fleshy granulations, one finds very minute ones, entirely yellow. The cornea does not appear to have any tendency to be involved. There is a mucous secretion. The lids are swollen, firm to the touch. The parotid region becomes very rapidly the seat of an inflammatory swelling which can extend to the neck and in the midst of which one discovers swollen and sometimes softened glands. There is fever with irregular chills; it can persist for a long time, but always remains moderate and does not gravely react upon the general state."

Very rarely the condition is bilateral. Hoor[3] reported two such cases. My series contains one. From the history given in my case it does not appear that there was any noticeable interval between the development of the conjunctivitis in one eye and its appearance in the other. The preauricular gland was enlarged on each side.

In general, the glandular swelling is more or less simultaneous with the occurrence of the conjunctivitis. In one of my cases, however, the enlargement of the glands appeared more than two weeks after the first ocular symptoms were noticed, and in another case the glandular swelling was present six weeks or longer before the eye became reddened. The glands are often tender, distinctly painful, and they sometimes suppurate.

Constitutional symptoms were absent

*Presented before the American Academy of Ophthalmology and Otolaryngology, at Washington, D.C., in October, 1938.

or slight in the great majority of cases in my series. Onset was mild, and the symptoms developed gradually. Two cases, on the other hand, are singled out by a clinical course that was strikingly different from that of all the others. Onset was rapid, with severe constitutional symptoms and very high temperature, reaching 106°F. in one case and 105.6°F. in the other. These two cases, furthermore, were the only ones of the series in which the lesion of the eye ulcerated. More will be said about these two cases when I come to speak of etiology.

Interest in the oculoglandular syndrome centers today in the problems of etiology. Parinaud made no pathologic nor bacteriologic studies. He pointed out that the cases which he was reporting gave the clinical impression of an infectious disease, and he suggested that the disease might be contracted from animals.

That the disease was a manifestation of tuberculosis was early suggested. In a few cases the tubercle bacillus has been demonstrated in material from patients' lesions, and animal inoculation with such material has produced lesions similar to those of tuberculosis. Von Szily[4] recently demonstrated tuberculosis after painstaking study in a case that was, clinically, a typical Parinaud's conjunctivitis. He believes that the infection was of the bovine variety. Nichelatti[5] thinks that Parinaud's conjunctivitis results from tuberculous re-infection of an allergic individual, which would explain the difficulty in finding the bacilli in the lesions and the spontaneous healing.

On the other hand, it has been shown that the oculoglandular syndrome can be caused by Bacterium tularense, by either of two organisms which are probably related to this bacterium—Bacillus pseudotuberculosis rodentium and an organism named by Pascheff,[6] its discoverer, Micrococcus bacillus polymorphicus necroticans—and by the leptothrix, first isolated from cases of the oculoglandular syndrome by Verhoeff, and since found in large series of cases by Sanford Gifford and others.

Analyzing my 23 cases from the standpoint of etiology, I am able to state that in 2 cases the patients' blood agglutinated with Bacterium tularense, in 4 cases the leptothrix was discovered, but in the remaining 17 cases no causative organism was demonstrated in spite of the fact that in 4 of these, biopsies were made of the conjunctival tissue, and several of our leading eye pathologists gave me their invaluable aid in the search. In 4 of these 17 cases of undetermined etiology, the agglutination test for tularemia was made and was found to be negative.

Tularemia has recently excited much interest among ophthalmologists both in this country, where it is better known, and abroad, where tularemia in any form has made a recognized appearance only within the last few years. The first case of tularemia in man, which was diagnosed and proved by laboratory methods, was, as related by Vail,[7] a case of tularemia of the conjunctiva. According to Francis,[8] of the United States Public Health Service, 8,137 cases of human tularemia had been reported in this country up to and including 1937. Cases have been reported from every state of the Union, except Vermont and Connecticut, and from the District of Columbia.

The conjunctiva was the primary seat of the infection in 68 or about 1-percent of the 6,274 cases of tularemia reported in this country up to 1936. Francis[8] states that the infection was transferred to the eye by the hands, while dressing rabbits in 52 of the 68 cases.

Certain European authors[9] are today pressing the viewpoint that Parinaud's conjunctivitis and oculoglandular tularemia are one and the same disease.

This view challenges special attention in America, where tularemia in its various forms is so much more prevalent than anywhere else in the world and Parinaud's conjunctivitis is seen at least as frequently as elsewhere. My own experience, which has allowed me to obtain first-hand impressions from two cases of proved oculoglandular tularemia during the time that I was seeing a comparatively large number of cases that were typical of the disease described by Parinaud, leads me to the conviction that oculoglandular tularemia should be separated entirely from Parinaud's conjunctivitis. To make my reasons for this opinion clear, I shall describe in some detail the clinical picture of my two cases of proved oculoglandular tularemia.

Case histories of oculoglandular tularemia

Case 1. P. T., a white boy, aged 12 years, entered the hospital January 25, 1930, because of pain, swelling, and redness of the left eye, and tenderness with swelling of the left side of the neck of two days' duration, high fever (temperature up to 106°F.) and general malaise.

The patient attributed the swollen eye to a blow from the elbow of another boy, received about eight days previously.

Physical findings: The patient appeared acutely ill, with a temperature of 104°F. The preauricular, cervical, and submaxillary glands on the left side were enlarged and extremely hard and tender. The throat was generally red, with several small white patches.

Ocular findings: Vision seemed to be approximately normal, but the patient was too ill to permit of accurate testing. The right eye appeared to be normal. The lids of the left eye were markedly swollen and reddened. On the congested palpebral conjunctiva were many small yellowish ulcers. The other structures of the eye appeared to be normal.

Diagnosis: A tentative diagnosis of Parinaud's conjunctivitis was made, but in view of the high fever and the seriously ill condition of the patient later in the day, the possibility of tularemia was considered, and questioning brought out the fact that the boy had killed and skinned two wild rabbits one week before the onset of symptoms. Blood taken five days after the patient entered the hospital was reported by Dr. Edward Francis, of the United States Public

Fig. 1 (Hurst). Lymphadenopathy, seven weeks after primary infection, in case of ocular tularemia.

Health Service, as having positive agglutination for Bacterium tularense in dilutions of 1:28. Blood taken 10 days later showed positive agglutination for Bacterium tularense in dilutions of 1:5120.

Clinical course: The patient continued to have fever up to 104°F. for 30 days. Most of the glands on the left side of the face began suppurating after about one month and discharged for several weeks. The conjunctiva returned to normal at the end of six weeks.

TABLE 1

SYNOPSIS OF TWENTY-THREE CASES OF OCULOGLANDULAR DISEASE

Case No.	Age	Sex	Race	Temp.	Glands	Etiology	Remarks
1	12	M	W	106.0	Preaur. submax.	Tularemia	Positive agglutination. All glands suppurated.
2	6	F	W	98.4	Preaur. cerv.	Unknown	
3	35	F	W	100.0	Preauricular	Unknown	
4	14	M	W	101.0	Preaur. bilat.	Unknown	Verhoeff reports not typical of Parinaud's appearance of rhinoscleroma. Unable to make a diagnosis.
5	23	F	W	101.4	Preaur. cerv. submax.	Unknown	
6	20	F	W	98.4	Preauricular	Unknown	
7	20	F	W	98.0	Preauricular	Unknown	Friedenwald reports unable to make a diagnosis. Does not appear to be T.B.C. or Parinaud's.
8	5	M	W	101.0	Preauricular	Unknown	
9	7	M	W	98.4	Submax. cerv.	Unknown	
10	24	M	W	99.0	Preaur. cerv.	Unknown	
11	13	F	W	100.5	Preaur. bilat.	Unknown	Both eyes involved.
12	15	M	C	99.2	Preaur. cerv.	Unknown	Preauricular glands suppurated and drained several weeks. Cultures from discharge, negative.
13	5	M	W	98.4	Submax.	Unknown	
14	10	M	W	100.0	Preauricular	Unknown	Blood count showed no eosinophiles.
15	60	F	W	99.0	Preaur. submax.	Unknown	
16	29	M	C	98.2	Preauricular	Unknown	Friedenwald reports not Parinaud's. Col. Ash suspects it was. Eos. 3%.
17	26	F	W	100.0	Preauricular	Unknown	
18	33	M	W	98.0	Preauricular	Unknown	
19	9	F	W	99.6	Preauricular	Leptothrix	Leptothrix found by Dr. Lamb. Eos. 3%.
20	21	M	C	105.6	Preaur. submax.	Tularemia	Agglutination positive. No suppuration of glands.
21	8	F	W	98.0	Preauricular	Leptothrix	Leptothrix found by Dr. Gifford. Eos. 9%.
22	7	F	W	104.0	Preauricular	Leptothrix	Leptothrix found by Dr. Gifford. Eos. 4%.
23	6	M	W	100.2	Preauricular	Leptothrix	Leptothrix found by Dr. Verhoeff. Eos. 8%.

Case 20 (see table 1). B. M., a Negro male, aged 21 years, was first seen in consultation September 4, 1937. He had been injured in the right eye one week previously by being struck by the branch of a tree. Three days after the injury fever appeared, and the temperature rose to 104°F. The injured eye was reddened, swollen, and painful; there were pain in the head and shoulders, sore throat, and general malaise. The patient had been confined to the hospital, where a thorough general examination had revealed no cause for the fever other than what appeared to be a mild tonsillitis.

Ocular findings: Examination of the right eye showed a deep corneal abrasion

in the pupillary area, with some swelling of the lids and more than usual injection of the palpebral and bulbar conjunctivae. There was very little secretion in the conjunctival sac. The right eye was otherwise normal. The left eye appeared entirely normal. Since the patient was acutely ill, his vision was not tested.

Diagnosis: A clinical diagnosis of tonsillitis and traumatic injury to the left eye was made at this time. The diagnosis of tularemia was not entertained until 14 days later. The patient's blood was then tested for agglutination with Bacterium tularense and was found positive in dilutions of 1:640.

Clinical course: After the time of my first examination, the patient continued to run a very high fever, and in about seven days the right preauricular and submaxillary glands enlarged. Fourteen days after the first consultation, he was seen again by me. He had been seriously ill, with temperature up to 105.6°F., and no diagnosis had been made, though he had been observed carefully by his physicians and had had thorough laboratory checks. Examination of the right eye now showed typical lesions of tularemia of the palpebral conjunctiva, with nodular ulcerations having yellowish centers, the picture so vividly described by Dr. D. T. Vail, Sr.[10] as looking "like yellow polka dots in a piece of turkey red calico." The corneal wound had not healed, as would have been expected, but remained as an excavated ulcer. The preauricular and submaxillary glands were greatly swollen and very tender. At this time the diagnosis of tularemia was established by an agglutination test. The patient continued to run a high fever for six weeks after the onset of the disease. The lymphatic glands did not suppurate. When the patient was last seen, four months after onset of the disease, the conjunctiva had returned to normal, but a large scar was present in the cornea, which reduced the vision to light projection.

The occurrence of trauma to the eye about the time of the contraction of the infection in both my cases of tularemia may be worthy of note. Francis[8] states that since the organism will penetrate normal skin, a wound of entry is not necessary for infection, but that in the majority of human cases a wound of entry has been inflicted at the site of cutaneous infection either at the time of infection or shortly after or before.

Fig. 2 (Hurst). Conjunctival granuloma with preauricular adenopathy.

For comparison with these cases of proved oculoglandular tularemia, I will describe more briefly the clinical features

of a case in which Dr. Sanford Gifford demonstrated the leptothrix in sections of the conjunctival vegetation.

Case history of leptothricosis

Case 21. P. N., a white girl, aged 8 years, first noticed a swelling in front of the left ear one week prior to entering the hospital. The swelling was hard and slightly tender. Two days before admission the left eye was swollen. There were no other symptoms on admission. Examination showed a hard, nontender, fixed, left preauricular gland measuring about 3 by 3 by 3 mm. The upper lid of the left eye was diffusely reddened, there were numerous follicles, and a polypoid vegetation, measuring 1 by 2 by 3 mm., springing from the center of the upper fornix. The temperature was 98°F., rising to 101°F. later that day. During the following six days the temperature oscillated between 97° and 100°F. Recovery was complete in three weeks.

Fig. 3 (Hurst). Conjunctival granuloma with preauricular adenopathy.

The following case is described as an example of a case of the oculoglandular syndrome with unknown etiology. The histologic sections were examined by Verhoeff and failed to disclose the leptothrix or to provide the basis for any other etiologic diagnosis.

Case history of oculoglandular syndrome of unknown etiology

Case 4. C. E. S., a white boy, aged 14 years, had noticed swelling of the lids of the right eye and roughness in this eye for two weeks, but there had been little discomfort, and the condition had not interfered greatly with his school work. Examination showed much swelling of the lids of the right eye and on the upper palpebral conjunctiva a growth, the size of a pea, surrounded by enlarged follicles. During the next few days the preauricular and anterior cervical lymph nodes enlarged and became sensitive to pressure. The temperature was 101°F. The blood agglutination test for tularemia was negative. At the end of six weeks the temperature had returned to normal and the conjunctival lesion and adenitis had subsided.

No clinical differences are apparent between those cases of oculoglandular disease in which the leptothrix appears as the etiologic agent and those cases in which diligent search has failed to disclose the etiology. Nevertheless, I feel that progress will be faster in arriving at the true nature of disease presenting the oculoglandular syndrome if we hold steadily to an etiologic classification in so far as we can assure ourselves of the etiology in the individual case. Where the tubercle bacillus has been shown to be

the etiologic agent, I would term the disease tuberculosis; where the patient's blood agglutinates with Bacterium tularense, I would call it tularemia. Where Verhoeff's leptothrix is found, the logical thing would seem to be to call the disease leptothricosis. It may well be that the future will show the leptothrix in an ever increasing number of cases of typical Parinaud's conjunctivitis, so that we shall be justified in reserving the latter designation exclusively for cases of this etiology. Those cases in which no etiologic agent can be discovered I would place in a group by themselves, as cases of the oculoglandular syndrome of unknown cause. That there is an organism, or organisms, as yet unsuspected, capable of producing the oculoglandular syndrome with a clinical picture that is typical of Parinaud's conjunctivitis, seems, in consideration of my series of cases, to be strongly probable.

Fig. 4 (Hurst). Lesion on lid in which the leptothrix was found.

Summary

In 23 cases of oculoglandular disease, with histologic studies on 12, no clinical difference was noted between cases in which the leptothrix was found and cases in which it could not be demonstrated. Two cases of oculoglandular tularemia were sharply differentiated from the cases of Parinaud's conjunctivitis by their clinical course and agglutination reaction, which bears out the contention that these are separate disease entities.

I should like to express my appreciation to Dr. F. H. Verhoeff, Dr. Sanford Gifford, Dr. Harvey Lamb of Washington University, Dr. Percy Friedenwald of Johns Hopkins, Colonel Ash of the Army Medical Museum, Dr. J. L. Goforth, and the Department of Pathology of Baylor University for the bacteriologic and the pathologic study of these cases.

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Discussion

Dr. Sanford R. Gifford, Chicago: Dr. Hurst has had a remarkable experience in being able to see and diagnose 21 cases of Parinaud's conjunctivitis and two of oculoglandular tularemia. Only one other man, Dr. Verhoeff, has had a greater experience with the disease, and of the 45 cases from which he examined material I do not know how many he saw personally. It is remarkable that such a profusion of cases should have been seen in two localities so distant geographically and in every other way, as Boston and Longview, Texas. The only conclusion to be drawn from this is that the condition is more common than is usually believed over a widespread area, and that groups of reported cases accumulate in localities that possess an ophthalmologist interested in the condition. About eight years ago I saw one of Dr. Hurst's cases while at a meeting in Dallas and could confirm his diagnosis of Parinaud's conjunctivitis. I examined material from this case and found what I considered elements of leptothrix in sections. They were few in number, however, and Dr. Verhoeff did not agree with my identification. In material from another case that he saw not long after this, I was unable to find threads of other organisms. In two other cases from which he sent me material this summer, however, many undoubted leptothrix threads were present, in the capillary spaces and free in the tissues. There can be no doubt, therefore, that in these two cases at least he was dealing with leptothricosis conjunctivae.

In 18 of his cases findings were negative. As I understand it, these cases were clinically similar to the ones in which leptothrix was found. Dr. Hurst states that in 12 of these cases tissue was not removed for sections, and it seems more than posible that leptothrix might have been found in some of these. I would like to emphasize the simplicity with which such material can be taken. Nothing need be said to the patient. Two or three applications of 10-percent cocaine are made to the conjunctiva at the site of a lesion and after waiting three minutes it is removed by one snip of a very sharp iris scissors. In one of Dr. Hurst's cases and in several of mine, where one especially large granulation was present, such removal has seemed to hasten clearing up of the lesions definitely. Dr. Hurst has not mentioned that in some cases the granulations are very small or even absent, but that there are present in all cases small gray areas which Verhoeff has described as points of focal necrosis. These seem to be the essential lesions, and it is in these areas that leptothrix threads are found. In at least one of Dr. Hurst's cases in which I found many leptothrix threads, many giant cells were present, a finding which, I believe, differs from those of Dr. Verhoeff. Aside from the four cases from which I saw only the material, I have seen 10 cases of the condition in Nebraska, Illinois, and Texas. In three of these, the first cases I had seen, sections were negative. In one, permission to remove material was refused. In six cases sections showed the elements of a thread-mold which, in view of the positive cultures of Verhoeff and King, one must be disposed to accept as a variety of leptothrix. In one case the material was from the only lesion present at the time it was removed and portions of a vegetable foreign body were found embedded in the tissue. Hence in this case, it seemed that the primary lesion was removed, and that inoculation had occurred by the embedding of this vegetable particle in the upper cul de sac. These cases have been reported elsewhere, ex-

cept for two seen this year. One of these was in a patient with unilateral adenopathy and one small polypoid mass in the upper fold. Many elements of a thread-mold were found in sections and cultures according to Verhoeff's method made by Dr. Day from the preauricular gland showed a leptothrix. The case will be reported in more detail elsewhere. Cultures from the gland in another case were not made until most of the swelling had disappeared, about six weeks after the onset, and were negative. Since the report of Verhoeff and King, Wright has grown leptothrix from the preauricular gland of a patient.

It is unfortunate that demonstration of the leptothrix in sections and its growth in culture should both be slightly complicated procedures. Cultures require that special media and facilities for partial carbon-dioxide tension be prepared beforehand and demonstration in sections requires removal of one of the essential lesions, its fixation in Zenker's fluid and some experience with Verhoeff's modified gram stain to prevent complete decolorization of the threads. It is undoubtedly these details which have prevented identification of the threads by a larger number of observers.

This has allowed the importance of Verhoeff's discovery to escape the attention of many ophthalmologists, especially in Europe. I became engaged in a mild polemic with Professor Junius of Bonn following his publication in 1932 (Zeit. f. Augenh., 1932, v. 78, p. 142). While he was familiar with the reports of Verhoeff and myself, he apparently believed that most cases of the condition described by Parinaud were really cases of tularemia. This was apparently due to the fact that leptothrix had never been found by a German ophthalmologist. The same point of view was expressed by Pillat and David in 1937, who emphasized the relative frequency of oculoglandular tularemia. Professor Pillat was finally convinced of the pathogenic importance of leptothrix after Dr. Verhoeff had sent him sections, but it cannot be said that my well-meant intervention accomplished very much towards clearing up confusion as to the name of the disease. It is to be hoped that this remarkable collection of cases by Dr. Hurst will come to the attention of many European colleagues.

It still seems to me confusing and misleading to use the names tularemia and Parinaud's conjunctivitis interchangeably. Tularemia is clinically distinguishable from other diseases by the agglutination test which is always positive in the second or third week and usually by a history of contact with rabbits or squirrels. The systemic symptoms are much more marked than have generally been observed in cases described as Parinaud's conjunctivitis. No fatalities have been reported in the latter condition and systemic symptoms are usually limited to slight fever and malaise for a few days after the onset. Agglutination tests for tularemia were made in three of my cases and in two cases seen by Dr. Dillon which were mentioned in a previous paper. They were negative in all as they were in four of Dr. Hurst's cases. During the time when these cases classed as Parinaud's conjunctivitis were seen, I have seen only one case of oculoglandular tularemia. The patient gave markedly positive agglutination tests, was severely ill, and had butchered wild rabbits. This picture agreed with the marked general symptoms seen in Dr. Hurst's two cases of oculoglandular tularemia and those of most reported cases. I have never seen corneal ulceration in leptothricosis, but it has been reported in cases of tularemia, as in Dr. Hurst's case. This experience gives me a personal impression of the relative frequency of leptothricosis con-

junctivae and tularemia, at least in the middle west of North America. I have seen one case of conjunctival tuberculosis during the same time with positive bacteriologic findings.

The presence of eosinophilia, which was noted in a number of cases of leptothricosis, is not constant enough to be of positive diagnostic value. It was present in about half of my cases in which differential blood counts were made, amounting to 3.5 percent, 10 percent, 4.5 percent, 8.5 percent, and 8 percent in five cases of which records are at hand. Dr. Hurst found it in only half of his cases. Hence it may be considered suggestive but by no means essential to the diagnosis. I believe it has not been reported in tularemia.

It is probable that ophthalmologists will continue to associate the name of Parinaud with the picture of unilateral adenopathy and conjunctival granulations. This is likely to be true in spite of modern refinements that make possible a division of this picture into at least three etiologically distinct entities. Hence the suggestion that I proposed in 1934 still seems a reasonable one, that the general picture be denoted as the *Conjunctivoglandular syndrome of Parinaud* and that modern means be employed to differentiate the three diseases which may, in some cases, somewhat resemble each other. These three conditions are, of course, leptothricosis conjunctivae, the oculoglandular form of tularemia, and conjunctival tuberculosis. Every case falling in this general syndrome should have an agglutination test for tularemia, examination of excised tissue fixed in Zenker's fluid and stained by Verhoeff's method, examination of excised or curetted material for acid-fast bacilli with guinea pig inoculation when possible, and careful inquiry regarding exposure to wild rabbits or squirrels. Although requiring more preparation, there should be added as exceedingly desirable cultures of aspirated pus on serum agar in containers subjected to 10 percent carbon-dioxide tension.

DR. ALBERT C. SNELL, Rochester, New York: I should like to call attention to Dr. Gifford's remark about taking a piece of tissue without the patient's knowledge. That is absolutely illegal under common law, and practically every other law in the states of the United States. If you get by with it, it is all right, but you lay yourself open to malpractice suits. You are not permitted under the law to remove any tissue from your patient, either dead or alive, without the patient's consent or the consent of those who may have authority over the body.

I thought that might be a warning to some of the members of the society. I think you can always get a specimen if you try hard enough.

NOTES, CASES, INSTRUMENTS

NEOPRONTOSIL IN THE TREATMENT OF RECURRENT TRACHOMATOUS ULCERATIONS OF THE CORNEA

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Whenever a valuable new drug appears on the market, it is at once tried out on all sorts of conditions for which it was not originally intended. This is but natural, for the real curative agents in medicine are few indeed. So, being confronted with a difficult case, I yielded to the temptation to try the much-heralded drug, prontosil, and sulfanilamide, and used it not by the injection method, but by local instillation into the conjunctival sac. The result was so gratifying that I decided to place it on record as it may be of some aid to some ophthalmic worker placed in the same dilemma.

Due allowance must, however, be made for the fact that in my case I used surgical means six months before applying this new drug. I used the regular 2½-percent solution in full strength dispensed in an ophthalmic bottle with a dropper and I directed my patient to instill one drop in the conjunctival sac three times a day. I presented the case before the Ophthalmologic Society of Philadelphia, feeling definitely that the good result obtained for my patient must be credited to the use of this drug.

Mr. W. M. consulted me on December 20, 1937, and gave the following brief history: He had had severe pain in his eyes, especially the right eye, for several years and had been treated for two years steadily by two physicians without obtaining any relief. The last course of treatment was slitting of the canaliculi and probing of the lacrimal duct.

The patient was in good general condition. The right eye was very painful, the lacrimation and photophobia were marked. The patient was unable to do any work and had to be indoors on account of the photophobia.

Examination revealed a markedly inflamed right eye, with marked conjunctival and ciliary injection; the tarsal conjunctiva was velvety and thickened and showed evidence of cicatrization. The cornea was covered with a fibrous tissue that was red because of the numerous blood vessels that covered the cornea. The corneoscleral margin was highly vascular. The anterior chamber could not be made out, nor could the pupil be seen through this vasular cornea. There were several small ulcerated spots, yellowish in color. The eyeball was soft, and vision was reduced to very poor light projection. The left eye also showed pannus formation at the corneal periphery. The central part of the cornea was hazy, due to corneal infiltration, and vision 6/60.

Diagnosis: Trachomatous recurrent ulcerative keritits superimposed upon trachomatous pannus.

The left eye was not ulcerated, but the fibrous vascular pannus has already progressed to about 5 mm. into the corneal tissue.

The problem of enucleation presented itself to me, and I frankly discussed it with the patient, for on account of the low tension and poor light projection there was not much to be hoped for as far as visual recovery was concerned. I presented to him the only alternative with a ray of hope, an operation on both eyes, since it appeared that the left eye was taking the same course as had the right eye. A tarsectomy would save the left eye and prevent further advance of the

pannus formation. The operation in the right eye, if successful, might stop the recurrent ulceration. He was satisfied. At the Jewish Hospital, on January 2, 1938, under evipal anesthesia, I removed the upper tarsal plates of both eyes, and performed a grattage on both lower lids.

The left eye made a rapid recovery, and I refracted the patient in June, 1938; with corrected lenses his vision was 5/9 and with presbyopic lenses he could read Jaeger 2. The right eye, however, remained troublesome, and recurrent ulcerations of the cornea, requiring cauterization, made their weekly appearance. I used carbolic acid and trichloracetic acid as cauterizing agents, and employed every drug known for instillation in his eyes, but apparently could not stop the recurrent ulcerations; the conjunctiva, however, was smooth.

The patient had not much pain, but considerable lacrimation and a very annoying burning sensation.

On August 2, 1938, I decided as a last resort to try prontosil and sulfanilamide. I used the prontosil, 2½-percent solution, instilling one drop in the right eye three times a day. Sulfanilamide 5-grain tablets three times a day. He could not take the drug internally and it had to be discontinued after three doses had been given. Five days later, following this treatment, he returned free from pain and the eye began to improve. No further ulceration appeared and in three weeks the photophobia had entirely disappeared; there was no more burning sensation, and the patient felt comfortable for the first time in three years.

The conjunctival redness began to disappear. The cornea became more clear and the vessels showed signs of disappearance.

Vision, however, in the right eye was only good light projection; no objects could be recognized. The cornea became semitransparent, so that the anterior chamber could be explored. In the pupil, a plastic exudation could be noticed. Tension was still −1. From this date, however, September 1, 1938, the patient began to walk about without dark glasses, and was perfectly comfortable and happy.

Numerous trachomatous cases have been reported in which sulfanilamide treatment gave good results. This, I believe, however, is the first case reported in which prontosil was used by local instillation. The result was so good that I think it should be given a trial in all recurrent ulcerations of the cornea and in all infectious ulcerations of the cornea of a protracted nature. The Winthrop Chemical Company was kind enough to answer my quest by stating that "we are aware of no report where prontosil was used locally in eye infections."

In the Journal of the American Medical Association, Dr. Fred Loe has reported the treatment of 140 cases of trachoma with sulfanilamide, but prontosil was not used locally in the conjunctival sac. The drug is of a reddish color, is nonirritating when administered in cases of ocular infections, and can be used freely by instillation.

I have drawn no conclusions from one case, but am presenting this case to ophthalmologists because it is worth while bearing this drug in mind in the treatment of ulcerative corneal infections.

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REVISED TECHNIQUE FOR BONE IMPLANT

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Chicago

Implantation of bone in Tenon's capsule or the muscle cone after removal of

an eye has been at times difficult or the results unsatisfactory for a number of reasons: Because of faulty technique the ball may not be heated sufficiently; or it may be put in too hot; or in inserting it flecks may become detached and stick to the conjunctival or other surfaces where they are unwanted; or the conjunctival sac may not be sterile; or infection from the enucleated eye may be a complication.

Recently I have had to remove a ball because of a severe bacteremia (scarlet fever) which developed three days after I had placed the implant. An osteomyelitis developed and the usual methods of control were unavailing. Some years ago I had to remove a bone implant that I had inserted too hot. It had caused necrosis in the surrounding tissue. The patient was a diabetic and the tissues would not heal. Since that experience I have put them in cold.

The balls are heated in a wire cage over an open (Bunsen) flame till they become red. Insufficient heating is to be condemned because spores may have become implanted. Mistakes are made by those who *reheat* them. Once the organic material has been burned out, the balls become very brittle. Indeed they have always to be handled with care, but more than one heating causes them to become unmanageable. They are not too brittle, if heated only once and kept sterile, to use with the proper inserter. Guist, who popularized them, used a very cumbersome implanter.

Mueller has made a simple device for this purpose. It is like the one used for the Mules glass spheres but has wider and stronger side pieces, and a slot in the end of the plunger through which a muscle hook can be introduced to hold the ball in place while the inserter is removed.

The technique we use at the Illinois Eye and Ear Infirmary is as follows: After the enucleation stop all hemorrhage. While this is being done, heat the bone ball in a wire cage over a brisk Bunsen burner till it glows a dull red. Allow it to cool. Place it in the inserter. Place chromic catgut purse-string suture through recti and Tenon's capsule. Hold the conjunctiva and Tenon's capsule open

Fig. 1 (Allen). Bone implant inserter.

by four sharp hooks or forceps in the region of the recti muscles, or by a suitable retractor, putting the tissues on somewhat of a stretch. Insert the inserter deeply into the cone and put a small muscle hook through the slot in the plunger to hold the ball in place while the inserter is withdrawn. Examine for flecks of bone. Pull up purse-string suture moderately tight. If necessary take extra sutures in Tenon's capsule to cover the bone entirely. Sew conjunctiva lightly.

122 South Michigan Avenue.

USE OF EMULSIONS IN OPHTHALMOLOGY*

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It is a common observation that the pupillary response to single dosages of drugs in aqueous solution is unequal. Similarly, effects on accommodation are unequal. There are a number of explanations. Drugs causing intraocular effects, for the most part, are absorbed through the cornea, and rather uniform response follows the application of equal dosage through this tissue. The variability noted in clinical practice with aqueous solution may be due to the winking out of the solution, irritability from pH, high surface tension, the relatively strong bond between drug and base, the state of the conjunctival secretions, unequal lacrimal drainage and dilution, and other causes. The use of aqueous eye drops results in both irregularity of time of application and dilution of the medicament. Ointments have not proved satisfactory due to the unequal absorption of drug from the base and the unequal application and dosage. The corneal obscurity from oil film has disturbed anterior-segment examinations. Some trend toward uniform response follows the use of a drug in buffer solutions, gelatin discs, multiple dosage, oilaceous bases, and after local anesthetic.

TABLE 1

DATA ON EMULSIONS FOR OPHTHALMOLOGICAL USE

Substance	Surface Tension*		pH Value**
	Dynes	at C.	
Distilled water (control)	72.8	24°	6.35
Plain emulsion (no drug content)	59.9	23°	4.75
Homatropine hydrobromide, 1% em.	61.1	23°	4.64
Homatropine hydrobromide, 2% em.	58.3	24°	4.62
Homatropine hydrobromide, 5% em.	55.1	24°	4.52
Atropine sulphate, 1% emulsion	57.8	24°	4.58
Neo-synephrin HCl, 1% emulsion	62.1	24°	4.6
Neo-synephrin HCl, 10% emulsion	61.8	25°	4.25

* The surface tension was determined by the use of a Cenco Du Nouy Tensiometer.

** The pH values were obtained by the use of a Leeds and Northrup Potentiometer with a quinhydrone electrode.

The viscosity (degree of fluidity) of the plain emulsion is 521 at 100°F. as determined by a Saybolt Universal Viscosimeter; that is, it takes 521 seconds for 60 c.c. of the plain emulsion to pass through the aperture of this apparatus, as, for instance, compared to a heavy mineral oil which runs 364 seconds to pass a 60-c.c. volume.

Why the emulsion vehicle has not been used in ophthalmology the writer is unable to state. It has been used on other mucous-membrane surfaces. The ophthalmic drug in an emulsion vehicle gives most uniform dosage. In this form the drug acts over a longer time, is more tenacious, does not wink out, and has a low surface tension. The visibility of the drop is high, it is easy to apply, and does not require a trained assistant. The drug is readily mincible with ocular secretions. An emollient effect is produced, since the contact of the emulsion with the eye is natural. The size of dosage is relatively constant. A wider range in pH is possible without irritation, and stability is high. The drops may be made mildly antiseptic and still non-irritating. The use of an emulsion does not interfere with anterior-

* From the Department of Ophthalmology, Wayne University.

segment studies. The more certain dosage saves time and is economical.

The most effective emulsion is the water-in-oil type. This may be due to both physical and chemical factors. The active ingredient placed in aqueous phase gives more rapid and complete action than the active ingredient placed in oil. The preparation should be put through a colloid mill.

The advantages of emulsion drops for office use far outweigh the disadvantages. Some of the latter are: An emulsion is more difficult to prepare, it leaves a residue of crumblike material on the lid borders (not irritating and easily washed off), patients mildly complain of stickiness and the blur. Emulsions require shaking before use. All of these disadvantages are a small price to pay for accuracy.

The use of drugs in emulsions for cycloplegia is particularly satisfying. Precision in dosage is especially important when the synergism of two drugs is employed for quick effect and quick recovery—the method of Beach and McAdams.[1] The writer has adopted Neosynephrin HCl as a sympathetic drug after animal and clinical tests[2, 3] had demonstrated its relatively longer, stronger, and more uniform action. He uses the following procedure: homatropine hydrobromide, 5.0-percent emulsion (or atropine sulphate, 1.0-percent emulsion), one instillation; after five to ten minutes, Neo-synephrin HCl, 1.0-percent emulsion, one instillation; the refraction is done 50 to 60 minutes after the last drop. In children and young adults an extra drop of homatropine hydrobromide, 5.0-percent emulsion, may be instilled after Neo-synephrin HCl, 1.0-percent emulsion. With strabismus patients the home use of cycloplegics may be reinforced by office use of atropine sulphate, 1.0-percent emulsion (or homatropine hydrobromide, 5.0-percent emulsion), and Neo-synephrin HCl, 1.0-percent emulsion; a drop of each spaced 5 to 10 minutes. After refraction has been tested counteracting miotics (eserine 0.2 percent, or pilocarpine 1.0 percent) are instilled once or twice. A single instillation of Neo-synephrin HCl, 1.0-percent emulsion, provides excellent dilatation for fundus examinations. The 10.0-percent Neo-synephrin HCl emulsion is used for the rapid and strong dilatation necessary to break the iris-lens adhesions complicating uveitis with or without secondary glaucoma. This preparation is a strong decongestive of the capillary bed. After a drop of local anesthetic a single instillation usually is sufficient, but occasionally a second is required. The dilatation effect is maintained by atropine or scopolamine. Some caution is indicated in patients with advanced arteriosclerosis or high blood pressure.

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CASE OF BILATERAL OPTIC ATROPHY FOLLOWING INSECT BITE*

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The case presented is one of bilateral optic atrophy. It is at first difficult to understand how an insect bite could cause such damage to the nerves, but after a complete study that did not uncover any other pathology, the conclusion was reached that the insect bite together with the subsequent infection was the causative agent.

Case Report. D. R., a white male, aged 15 years, entered the hospital with the complaint of inability to see light with either eye. He said that he had been stung on June 13, 1938, by some kind of insect, type unknown, on the left side of the face anterior to the ear. He had had a boil on the left side of the face just previous to the insect sting. The boil had healed, however. Two days following the sting the left side of the face and left eyelids began to swell. Five days later the left eye was swollen shut and the entire left side of the face was markedly swollen. He was taken to the Galesberg Cottage Hospital under Dr. C. G. Johnson on the 18th of June. Seven days following the sting he became unconscious and remained so for eight days, according to the patient's parents. On June 20th, the right eyelids became swollen and in two days were completely closed. The entire face became swollen, the swelling extending down to the neck on both sides. The patient complained at times of great pain throughout the head.

On June 21st, the patient was given prontosil. The temperature, which was at 105 degrees, dropped to 102 degrees within the next two days. On June 23d, prontosil was again given in the dosage of 10 c.c. The left side of the face was aspirated, but no pus was found. Hot wet boric-acid dressings were applied to the face. The temperature for the next three days varied between 104 degrees and 102 degrees. On June 26th, under evipal anesthesia, extensive opening was made by Dr. Bower in the left side of the face and drains were inserted. Improvement from this time was progressive.

Eye consultation on July 1, 1938, by Dr. H. E. Eastman, Dr. R. C. Maskney, and Dr. L. R. Mellon: The pupils were greatly dilated, did not react to light, and there was no definite light perception. The patient was unable to rotate the eyeballs. The media were clear, the retina swollen, with many hemorrhages throughout. The nerve heads were greatly swollen. There was a leucocytosis of 12,700, and a faint trace of albumin in the urine.

When the patient entered the Illinois Eye and Ear Infirmary on September 3, 1938, he was in no apparent distress. There was no light perception by either eye, and the pupils did not react to light. The pupils were equal, round, and regular, measuring 7 mm. Tension in the right eye was 14.5 mm. Hg, and in the left, 16 mm. There was edema of the tissue of upper and lower lids of both eyes, most marked in the lower lids. The superficial veins of the lids of the right eye stood out in relief. There was slight paresis of right superior rectus, right inferior rectus, right inferior oblique, and right superior oblique. No other external pathology was noted.

The media of the right eye were clear. The disc was white in color. Nasally, the outline was easily seen; temporally, however, there was blurring. There was an

* From the service of Dr. L. Hoffman at the Illinois Eye and Ear Infirmary, Chicago.

exudate on the surface of the disc, and the vessels were buried in exudate. The arteries were constricted, and there was a white haze along all vessels for a distance of about 2 P.D. The superior and inferior temporal veins were slightly congested. They were the most prominent of all the vessels of the fundus. The macula contained a patch of white exudate. The periphery surrounding the macula had a deposit of numerous white patches, which, extending superiorly and inferiorly about 3 P.D. and to the disc, varied from the size of a pinpoint to that of a pinhead or larger. These exudates were beneath the level of the retinal vessels. Temporal to the disc there was a confluence of these patches into radiating strands closely approximated.

In the left eye the media were clear. The disc, chalk white in color, had a normal outline, with a slight physiological cupping, but the lamina cribrosa could not be seen. The arteries and the veins were normal. No pathology was seen in the macula. There were no scars, exudates, or hemorrhages in the periphery. No pathology was revealed in the anterior chamber.

The physical examination revealed only alopecia areata, and redness of the left ear drum. X-ray study of the skull showed nothing pathological.

The blood Wassermann and Mantoux tests, and the blood chemistry were negative. A spinal test was not made in the Infirmary, but was made at the Billings Hospital in Chicago, and was found to be negative.

904 West Adams Street.

NASO-LACRIMAL DRAINAGE AFTER COMBINED EXTERNAL AND INTRANASAL TEAR-SAC OPERATION

CLYDE E. HARNER, M.D.
Long Beach, California

For some years I have been using a method for keeping patent an intranasal opening from the tear sac which occasionally may have a tendency to close after a combined external and intranasal operation such as the West or Toti-Mosher. So far as I know, this method is original with me, and because of its simplicity and ease of insertion I have been urged by several colleagues to report it.

Several drops of local anesthetic are instilled into the affected eye. After dilating the new drainage canal from tear sac to the interior of the nose with Bowman probes, a strand of stiff number-2, 20-day chromic gut suture is inserted into the lower punctum. It is readily passed into the nose, where it is grasped and pulled to the outside. The two ends are tied together and splinted to the side of the nose with a small strip of adhesive. The patient pulls the loop through the drainage canal a short distance several times a day, thus breaking up adhesions, until healing has occurred and patency of the opening is assured.

I have used this method because: 1. The strand can be inserted in a few seconds without pain to the patient (which is not true of the use of silk or linen thread). 2. It can be changed as often as necessary without inconvenience to patient or doctor. 3. It is well tolerated by the tissues and accomplishes the desired results in this occasional complication.

Security Building.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section on Ophthalmology

October 20, 1938

Dr. Alexander G. Fewell, *chairman*

Jaw winking: Marcus Gunn phenomenon (report of a case associated with congenital ptosis)

Dr. Carroll R. Mullen read a paper on this subject.

Discussion. Dr. Samuel B. Hadden said that cases such as Dr. Mullen reported are rather uncommon. The first case was described in 1883, and approximately 100 cases have been reported to date. The phenomenon is one that has not, as yet, been adequately explained. As Dr. Mullen's case so clearly showed, on opening the mouth there is a tendency for the upper lid to become elevated with resultant widening of the palpebral fissure. In this particular case this movement occurred on chewing and on rapid enthusiastic talking. At rest the palpebral fissure on the involved side is slightly narrower than on the good side and in many of the cases reported the pupil on the involved side is smaller.

The cases as reported to date may be divided into four groups: 1. Those in whom the upward movement of the eyelid occurs when the mouth is opened or directed to the opposite side. 2. Those in whom the upward movement occurs only on opening the mouth but not on lateral deviation of the jaw. 3. Those in whom elevation of the lid occurs only on lateral movement of the jaw but not with simply opening the mouth. 4. Those in whom the upward movement of the eyelid occurs in association with movement of the jaw but in whom there is no ptosis.

Various explanations have been offered but when it is recalled that on wide opening of the mouth there is normally an upward movement of the eyelid, it appears that the phenomena is most likely the result of an exaggerated normal associated movement. This explanation is the one most generally accepted but against it is the fact that many times the movement occurs when the jaw is passively opened or moved.

The treatment of the disability is most difficult although Grant recently reported a case in which relief was obtained through a section of the motor supply to the involved pterygoid muscle.

Dr. Francis Heed Adler noticed in the moving picture that there was a definite lack of winking in the left eye of this patient. Was this a constant finding? The theory which best explains the Marcus Gunn phenomenon is, in his opinion, a cortical lesion. The only muscles associated with the eye that have a separate cortical innervation are the levator and orbicularis muscles of the lids. The cortical center for the levator lies very close to the cortical center for the movements of the jaws. This seems much more likely to explain the association of jaw winking by a congenital lesion in this region than to assume a connection between the fibers of the fifth and third nerve farther down in the pathway.

Detachment of the retina successfully treated by the thermophore (two cases)

Dr. H. Maxwell Langdon presented the case of F. D. W., a white man, aged 55 years, seen first July 7, 1924, for the

correction of about two diopters of myopia in the right eye and one diopter of myopic astigmatism in the left eye.

He was seen again in 1927 for refraction. In July, 1930, he developed some vitreous floating opacities. At that time his systolic blood pressure was 180. Two teeth showed root infection and were extracted. The vitreous cleared in the right eye but some dots remained in the left eye.

In 1934 he was seen for refraction. On March 29, 1938, he was again seen because of some blurring of vision, which became 5/4 on correction of the refractive error. On May 4, 1938, he found there was a shadow over the left temporal field. Central vision was still 5/5 partly, but the whole temporal field of the right eye was lost from a complete detachment of the nasal portion of the retina, with a large tear up and in. The greatest elevation was seen best with plus 10 D.

On May 6, 1938, an operation was performed; nine thermophore applications at 160 degrees, of one minute each were made. Reattachment occurred, and the patient was discharged on May 27, 1938, with corrected central vision of 5/5 plus and a normal field of vision. The vitreous still shows a few floating dots.

Dr. Langdon next presented the case of W. T. L., aged 55 years, a white man, who was operated on for Dr. Andrew Knox at the Episcopal Hospital, in February, 1936, for detachment of the upper portion of the retina of the right eye. This patient was shown at this Section after the operation with a complete recovery of both central and peripheral vision.

On June 20, 1938, he came to the dispensary of the Presbyterian Hospital complaining of blurred vision in the left eye for two months, the diagnosis of the physician who had examined him being detachment of the lower portion of the retina of the left eye.

The lower half of the retina was elevated about 8 D., the upper portion of the field being lost; central vision was 6/60. No tears were seen in the detachment. On June 27, 1938, his left eye was operated on, eight thermophore applications being made. Recovery of peripheral vision was complete, the field being normal, but the central vision was improved to but 6/9—undoubtedly as the result of the delay of the operation.

So far, Dr. Langdon has operated on 10 eyes by this method. Seven have given perfectly satisfactory results with vision ranging from 5/5 plus to 5/22; this last one being a case which had been detached four months before operation. One other patient enjoyed a perfect result for two months when, in spite of definite advice, he exerted himself violently and suffered a redetachment. His vision, however, has improved from 2/60 to 5/4, and his field from only a small upper portion to a normal outline. One of the others was a man with 10 diopters of myopia, who had a fall sufficient to fracture his lower maxilla. He was not operated on until two months after the accident, the upper half of the retina being detached. The operation replaced the retina but three weeks later, before he was discharged from the hospital, there was a fresh detachment to the temporal side, although the retina at the site of the first operation stayed in place.

Discussion. Dr. James S. Shipman asked Dr. Langdon if he released the retinal fluid before he made his applications with the thermophore. If this is true it is contrary to any of the methods which he had used or had read about.

Certainly, it would seem to him that a wet field would interfere with the application of any type of heat or desiccation, and also with the globe soft or partially collapsed it would be more difficult to apply such an electrode. He is well aware

of the fact that this subretinal fluid must be released in order that the retina may come up against the coagulated points or areas of the choroid, but this can be done easily after the application of heat or diathermy needles has been made.

He believes that Dr. Langdon should not feel badly about a central visual result of 5/9. To him this would appear to be a very excellent result.

In favor of Dr. Langdon's method of using the thermophore for surface coagulation is the fact that the instrument can be used on any electrical current, and with the excellent results which he has obtained it sounds most interesting.

Dr. Langdon said in conclusion, in answer to Dr. Shipman, that this question is rather academic as it makes little difference with this method whether the fluid is permitted to escape before or after the thermophore applications. We do not have to have an eye sufficiently rigid to permit penetration of the sclera if this method is used.

In answer to Dr. Appleton's question, he said he believed that the good results were obtained because sufficient choroidal exudate is produced to weld the retina to the choroid and because great care has been used in the after treatment.

Objective signs of blindness with particular reference to applicants for pension for blindness

Dr. Alfred Cowan said blindness, according to the various acts for granting pensions to the blind, may be defined as partial or complete. The National Society for the Prevention of Blindness considers a person with a vision of 6/60 with the better eye to be practically blind for all ordinary occupations. This is in agreement with the definition of economic blindness prepared by the American Medical Association. Pennsylvania has adopted 10/200 central visual acuity or less in the better eye with correcting glasses as a definition of economic blindness.

Generally speaking, a central visual acuity of 6/60 or 20/200 is a very liberal interpretation of blindness. This represents a visual efficiency of 20 percent according to the table of Sterling and Snell. This is far from actual blindness, and the examiner might have to remind himself in his observation of the actions of applicants for pensions that a person even with 3/60 vision can recognize, although hazily, all large objects at ordinary distances. In daylight he can see the different colors of the landscape, the outlines of buildings and moving automobiles at a considerable distance, moving people at some distance, even recognize their features at 5 or 10 feet. He can read large headlines in the newspapers. Some people, accustomed to their partial blindness, get around remarkably well and are able to do a surprising number of things.

The prize of a regular monthly dole or pension is sufficient to induce many a person to simulate blindness or to exaggerate an existing partial disability, and experience justifies the statement that every applicant for state aid for blindness is a potential malingerer. Expert skill, knowledge, judgment, and alertness are often necessary for diagnosis when the sight seems low out of all proportion to the objective signs. A person may have sufficiently low vision to be eligible for pension and still have none of the signs of the totally blind person.

Special test cards with the larger letters cut out, doubling the regulation testing distance, poor illumination, and any of the other known strategems for the detection of malingering should be a part of the equipment of every examiner.

A knowledge of the objective signs of absolute blindness is not often useful for the purpose of diagnosing partial blind-

ness as defined by regulation in the various states. The amount of disability which might be caused by a certain lesion must, therefore, depend on the judgment, experience, and knowledge of the examiner; and if an applicant is intelligent, experienced, or coached, it will be extremely hard to prove that he is a fraud.

Bilateral endophthalmitis complicating pneumococcic septicemia

Dr. Jacob Reber and Dr. Harold Scheie reported a case of a 48-year-old white man who sustained a traumatic infection of the left foot which developed into a generalized septicemia, the first manifestation of which appeared as a bilateral endophthalmitis. Pneumococcus, type IV, was recovered from the blood stream and also from an eye removed at autopsy.

The use of rabbit antipneumococcus serum in the treatment of ulcus serpens

Dr. Harold G. Scheie said rabbit antipneumococcus serum, because of its smaller antibody molecule, higher antibody titer, and availability in increasing numbers of types, as compared with horse serum, might be used to great advantage in the treatment of ulcus serpens. One case was reported in an 87-year-old colored man with a favorable outcome.

Discussion. Dr. Leon H. Collins, Jr., said during the past two years there has been an increasing interest in rabbit pneumococcus antiserum both for typing and therapeutic purposes. It is now possible to diagnose the type of pneumococcus infection of the eye much earlier than in the past. A more concentrated serum is now available than formerly and one that usually gives less reaction. The evidence at present available suggests that the antibody molecule of rabbit pneumococcus antiserum is of smaller size than that of the horse pneumococcus antiserum. Horsfall and his associates have been able to demonstrate type specific rabbit antibodies in the pleural fluid of some patients with pneumococcic empyemas who had received rabbit pneumococcus antiserum intravenously.

The patient presented by Dr. Scheie had received rabbit antiserum both locally and intravenously. It would appear that the treatment here had influenced the course of the disease favorably, but further investigation is necessary to determine the mode of action and the relative value of these two methods of administration in pneumococcic infections of the eye.

Dr. Francis Heed Adler doubted that the antibodies, even in rabbit serum, would get into the normal aqueous when injected into the blood stream. It is quite possible, however, that the small size of the molecule in rabbit serum aids in the penetration into the cornea when the serum is instilled in the conjunctival cul-de-sac. Although the cost of this serum may at first seem prohibitive, it is a very small price to pay for saving an eye, and most manufacturing companies or insurance carriers would be glad to buy it rather than have to pay the compensation for the total loss of an eye.

Dr. Louis Lehrfeld said that 21 years ago, he read a paper before this Section of the College, entitled "Serum therapy as applied to pneumococcic infections of the eye." At that time he was secretary of the Pneumonia Commission of Philadelphia. It was the purpose of this Commission to disseminate information on the prevention of pneumonia and on its treatment by the use of antipneumococcic serum.

At that time there were recognized four types of the pneumococcus. Sera were available for type one and type two. It occurred to him that a mixture of sera of

type one and type two might be of service in the treatment of dendritic keratitis due to the pneumococcus. With the advice of Dr. C. Y. White, Director of the Laboratories of the Health Department, Philadelphia, there were prepared for him ampules containing sera of type one and type two. This mixture of sera was used locally in the eyes of patients having pneumococcic ulcerative keratitis. His report indicates that encouraging results were obtained from its use.

He is gratified to know that great advances have been made in the numerical classification of the various types of pneumococci, since the date of his report, and that sera are now available, depending upon the type of organism present.

Warren S. Reese,
Clerk.

COLORADO OPHTHALMOLOGICAL SOCIETY

October 22, 1938

DR. E. M. MARBOURG, *presiding*

RECURRENT VITREOUS HEMORRHAGES IN YOUNG PEOPLE

DR. FRITZ NELSON presented the following three cases to illustrate intraocular hemorrhages in young people.

Case 1. Miss W. C. L., aged 33 years, had been examined at the Dartmouth Eye Clinic in March, 1937, at which time retinal hemorrhages from thrombosis in a branch of the central vein were found in the right eye. There was a moderate degree of anemia and a systolic blood pressure of 210 mm. In May, 1938, the right eye became suddenly blind. Both eyes appeared normal externally. The lower part of the vitreous of the right eye was rendered entirely opaque by blood. A dim fundus reflex was present superiorly. There was a dense mass adjacent to the lens equator inferiorly, apparently very close to the ciliary body. The upper and interior part of this mass was covered with dark-red blood.

The left eye appeared to be entirely normal except for pallor and narrowing of the main retinal arterial branches and increased thickness of their walls. The choroid appeared sclerotic. The vision of the right eye was ability to count fingers at one meter. The vision of the left eye was normal.

General physical examination, including Wassermann and tuberculin tests, was negative except for anemia and a systolic blood pressure of 180 mm. A diagnosis of essential juvenile hypertension was made by the clinician. The patient's father died at the age of 48 years from heart disease and hypertension. Dr. Guy Hopkins stated that there is some evidence to indicate that hypertension of this type is due to obscure endocrine dysfunction.

Case 2. W. R., a white male, aged 35 years, had, in July, 1937, a brief painful attack of inflammation in the right eye. In September, 1937, both eyes became practically blind within one or two days. At that time he was seen by two ophthalmologists in Kentucky who ordered the tonsils to be removed. In April, 1938, diagnosis of ocular tuberculosis was made in Kentucky after a very strongly positive skin reaction had been obtained with one milligram of tuberculin, intracutaneously.

This man was first seen by Dr. Nelson in Colorado Springs, in May, 1938. The general physical examination was negative except for some increased hilus markings and calcification in the chest X-ray film. The right eye was convergent about 10 degrees. There was moderate pericorneal injection. There was a deep and superficial corneal opacity and vascularity inferiorly, representing typical keratitis scleroticans. There were numerous old and fresh (mutton-fat) keratitic precipi-

tates; a gray nodular formation about one-half millimeter in diameter was found in the chamber angle. The aqueous contained many cells. There were newly formed blood vessels in the anterior layer of the iris, and recent and old posterior synechiae and pigment deposits on the lens surface. A circumscribed posterior capsular cataract was present. The vitreous body contained numerous dense floating opacities. A vitreous reflex but no fundus details could be seen. Vision consisted of ability to count fingers at one meter.

The left eye showed a slight amount of pericorneal injection. The cornea was clear. There was a large nodulelike deposit attached to the posterior surface of the cornea, inferiorly. The aqueous contained a moderate number of cells. The iris appeared essentially normal except for numerous delicate posterior synechiae. There was a subcapsular cataract similar to that found in the right eye. The vitreous body was not so cloudy as the right. Several gray strands of connective tissue protruded into the vitreous from the retina. The disc was somewhat pale. There was a large yellow chorioretinitic focus in and around the macula. Wedge-shaped pigmented foci were present in the temporal periphery. Vision consisted of ability to count fingers at one meter. Treatment has consisted of bed rest and scopolamine, dionin, and hot packs used locally. General sun treatments were given several weeks after admission. Tuberculin injections with an initial dose of 1/100,000 mg. were given at weekly intervals after the eyes were completely quiet. When presented to the Society the uveitis was practically healed. The vision of the right eye was 5/25, and of the left eye, 5/35.

Case 3. B. F., a football player, aged 21 years, had a past history essentially negative except that the man had lost 10 pounds during the preceding summer. On September 12, 1938, the patient was given a routine diagnostic intracutaneous injection of 1/10 mg. of tuberculin at the college infirmary. This resulted in a severe local cutaneous reaction. About 18 days later the patient noticed blurred vision of the left eye. When first seen on October 11, 1938, there was a severe iritis in the left eye with numerous keratitic precipitates, cloudy aqueous, posterior synechiae, and a small, typical tuberculous nodule in the iris. There was generalized retinal edema and slight papilledema. The retinal veins were engorged. No perivascular foci could be seen. Two days later acute iritis with retinal edema developed in the right eye. On October 14th, numerous typical tuberculous periphlebitic foci rapidly developed in the lower parts of both retinae. These foci, resembling bluish-gray balls of cotton, were usually located at bifurcations of the peripheral veins and were always connected with venous branches. Treatment consisted of bed rest and the local application of scopolamine. Tuberculin therapy was considered too dangerous to use.

Dr. Nelson concluded that the most common cause of vitreous hemorrhages in young males is tuberculous periphlebitis. This is frequently associated with uveitis. Syphilis or Buerger's disease must be excluded. Vitreous hemorrhages in young women do not usually indicate tuberculosis. In case 1 the recurrent hemorrhages were apparently caused by the rare hypertensio arteriarum praecox. Case 2 represents the usual type of tuberculous uveitis associated with chorioretinitis proliferans. Case 3 is an early example of the same type. The sudden onset seems to have been caused by the diagnostic injection of 1/10 mg. of tuberculin and demonstrated the potential danger in its indiscriminate use. The prognosis in the third case is very favorable. Immediate bed rest is the most important factor in the treatment of highly tuber-

culin-allergic patients. In every case in which sudden blindness associated with vitreous cloudiness occurs in young men, tuberculosis of the retinal vessels should be strongly suspected especially if iris nodules, keratitis scleroticans, and so forth, are present. Tuberculosis tests should always be applied very cautiously. In a highly allergic patient, a dose of 1/10 mg. tuberculin can be very dangerous. In such patients even 1/100,000 mg. can sometimes cause serious reactions. If tuberculosis of the eye is suspected, diagnosis should be verified as quickly as possible. Valuable time should not be wasted in studying focal infection of teeth, tonsils, and so forth. A tuberculous infection of certain lymph glands may also serve as a focus. Such foci are not usually associated with serious pulmonary infection. Physicians do not sufficiently recognize the fact that in tuberculosis of the eye the lungs usually show no gross evidence of tuberculosis.

IRIDOCYCLITIS

DR. V. H. BROBECK presented A. D. H., a white man, aged 34 years. In 1924 a diagnosis of exudative retinitis of the left eye was made. At the time of presentation an old atrophic area bordered by pigment could be seen near the macula. In August, 1938, the vision of the right eye failed rapidly, associated with photophobia and pain. Examination at that time showed mild ciliary injection, moderately large keratitic precipitates, and vitreous opacities. There were fine, clumped, brown-pigment granules on the anterior lens capsule. Intradermal tuberculin tests were positive in high dilutions. The Wassermann reaction was negative. Two injections of typhoid (H) antigen were given followed by paracentesis of the anterior chamber. Also 10 injections of Old Tuberculin beginning with 0.0008 mg. were given. Rapid subsidence of the acute symptoms followed the use of the typhoid therapy.

CHORIORETINITIS IN PERNICIOUS ANEMIA

DR. V. H. BROBECK presented a case of F. T., a 62-year-old white man. The right eye had had a traumatic cataract for many years. There have been attacks of chorioretinitis in the left eye at intervals since 1925. The patient has been treated for pernicious anemia since 1927. At the time of presentation there was a large patch of choroidal exudate in the left fundus. This was traversed by retinal vessels. The optic nerve had a waxy appearance resembling the pallor of an advanced atrophy. There has been at times a generalized pallor of the entire fundus. Retinal hemorrhages have appeared from time to time over a period of years. These were usually flame-shaped. The hematological picture was characteristic of pernicious anemia.

John C. Long,
Secretary.

WASHINGTON, D.C., OPHTHALMOLOGICAL SOCIETY

November 7, 1938

DR. G. VICTOR SIMPSON, *president*

CHORIORETINITIS POSSIBLY DUE TO BOVINE TUBERCULOSIS

DR. EDWARD J. CUMMINGS presented a case.

Discussion. Dr. Oscar Wilkinson commented upon the case saying that he had seen one similar to this, presumably due to bovine tuberculosis, which had been treated with "Bovine tuberculin" with good results.

MASSIVE EXUDATIVE CHOROIDITIS WITH COMPLICATED CATARACT (AND TRANSITORY SECONDARY GLAUCOMA)

DR. JAMES N. GREEAR presented a case.

Discussion. Dr. Benjamin Rones cited

a similar case which, though all tuberculin tests had been negative, proved to be definitely tuberculous from the evidence of the microscopic section after enucleation. He suggested tuberculin therapy for the present case.

HEALING UVEITIS WITH RETINAL TEAR AND DETACHMENT DURING THE HEALING PROCESS

DR. B. J. GURWIN commented upon the case, stating that the tear and detachment had occurred within the last three or four days when the healing process was well advanced.

ADVANCED TUBERCULOUS IRIDOCYCLITIS AND SCLEROKERATITIS (BILATERAL)

DR. FRANK D. COSTENBADER presented a case.

Discussion. Dr. Benjamin Rones distinguished this condition from a corneal dystrophy and discussed briefly the method of progression of so-called sclerosing keratitis. He further suggested that recent work with the beta rays, using radon bulbs and no ocular shield, had seemed to be somewhat helpful in similar cases.

Dr. L. Philip Cox said that sanitorium treatment with complete rest, such as is indicated in general tuberculosis, would be wise.

Dr. Costenbader, in further discussing the case, said that irradiation with the regular gamma rays of the X ray had not been thought wise by the X-ray therapist and further mentioned that sanitorium treatment was not easily available for this patient even should it be thought wise.

SYPHILITIC PRIMARY OPTIC ATROPHY

DR. JOSEPH EARLE MOORE, of Baltimore, emphasized especially the relative merits of types of treatment and prognosis. 1. Sufficient diagnostic study, especially including close coöperation between the ophthalmologist and the syphilologist, is extremely important.

2. A great percentage of the primary-optic-atrophy cases occurs with tabes dorsalis. Winthrop, of Johns Hopkins University, in attempting experimentally to produce pernicious anemia in swine on a vitamin-B-deficiency diet, succeeded in producing lesions pathologically similar to tabes dorsalis in man.

3. The relatively high incidence of primary optic atrophy in the Negro as opposed to the relatively low incidence of neurosyphilis in the Negro was pointed out.

4. A chart was shown which clearly indicated the length of time between the first visit and the time complete blindness ensued. In six classifications: (a) All patients blind in seven years—all untreated cases. (b) All patients blind in seven years—all obviously inadequately treated cases. (c) Sixty-eight percent of patients blind in nine years even under presumed adequate routine treatment. (d) 50 percent of patients blind in 10 years with Swift-Ellis or similar treatment; the remainder maintained vision indefinitely. (e) Only 15 percent of patients blind in three years when treated with malaria, and the remainder maintained vision indefinitely. (f) Combinations of (c) and (e) or (d) and (e) or (c) and (d) produced results somewhat better than those in classification (e).

5. Tryparsamide is absolutely contraindicated in cases diagnosed as primary syphilitic optic atrophy.

6. Good results in the treatment of primary syphilitic optic atrophy are largely dependent on early diagnosis and adequate treatment of the neurosyphilis.

Frank D. Costenbader,
Secretary-Treasurer.

AMERICAN JOURNAL OF OPHTHALMOLOGY

Published Monthly by the Ophthalmic Publishing Company

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WANTED, AN AMERICAN OPHTHALMOLOGICAL SOCIETY

On the sixth of June of this year, the second day of the regular annual meeting held at Hot Springs, Virginia, the American Ophthalmological Society celebrated its seventy-fifth anniversary.

The commemoration took the form of a banquet which was attended by a large number of the members of the Society and their wives or occasionally others of their families. A distinguished and greatly appreciated guest was Mr. H. M. Traquair, of Edinburgh, Scotland.

In an excellent program the outstanding event was an address by Dr. Harry Friedenwald reviewing, with a wealth of significant detail as to personalities and activities, the history of the Society from its earliest days. Dr. Friedenwald has since circulated to the members of the Society a reprint of the "Account of the origin and first meeting of the American Ophthalmological Society," by Henry D. Noyes, written in 1875.

It was at Noyes's office in New York City that the first consultative meeting with regard to the need for formation of such a society was held, the others listed as present being Henry B. Sands, Herman Althof, John H. Hinton, F. J. Bumstead, D. B. St. John Roosa, and W. F. Holcomb, all of New York City, and Hasket Derby of Boston. This was on January 9, 1864.

The actual organization of the new Society took place on June 7, 1864, at the New York Eye Infirmary, at the time of the meeting of the American Medical Association, eighteen gentlemen being pres-

ent. Dr. Edward Delafield, one of the general surgeons who formed an important proportion of the early membership of the American Ophthalmological Society, was elected president, and Dr. Noyes secretary.

The American Ophthalmological Society was founded after, but in the same year as, the Heidelberg Ophthalmological Society, later known officially as the Deutsche Ophthalmologische Gesellschaft. The Ophthalmological Society of the United Kingdom was not organized until 1880, and the French Société d'Ophtalmologie came into existence in 1883.

The American Medical Association, whose Section on Ophthalmology is now one of the most important ophthalmological organizations in the country, had been founded in 1847 "to improve the disgraceful status of medical education in the United States." This was four years before Helmholtz's invention of the ophthalmoscope.

It is amusing to recall that the first journal to carry the name "American Journal of Ophthalmology" was founded by one Julius Homberger, a New York practitioner who was rather generally rated by his colleagues as a quack. His journal expired before the second volume was completed. He advertised extensively, was expelled from the American Medical Association in 1868, and died insane. Hasket Derby humorously attributed to Homberger the foundation of the American Ophthalmological Society, because the original purpose of the first consultative meeting called by Noyes in 1864 was really (according to Derby) "to concert measures for the establishment of a magazine that should be respectable."

In those years the term "specialist" was in rather doubtful repute. At the second meeting of the American Ophthalmological Society, in 1865, an address by Noyes on the subject of "Specialization in medicine" spoke of the discredit cast on the practice of medicine by "persons claiming almost marvelous abilities, and guilty of most unseemly conduct . . . such as the corn doctors, the bone setters, the electricians, the pimple doctor, the hair restorers, the pill doctors." "This sentiment," Noyes observed, "will no longer continue when special departments of medicine fall in the hands of right minded men."

In 1868 the American Ophthalmological Society adopted the rule that no member of the Society should attach to his name, in any public announcement, the title of oculist or any similar title or should "announce in print that he gave special or exclusive attention to special practice." This rigid rule, it may be remarked, was made before the existence of telephones or telephone directories, and also before the publication of a national medical directory by the American Medical Association. As years went by, the rule came to stand in opposition to the custom of a large proportion of the ethical and honorable ophthalmologists of the United States.

Some of the more progressive members of the Society recognized that the rule went too far, and that it militated against the convenience of physician and patient. It was repeatedly the subject of discussion at the Society's meetings; but its severity was not modified until in 1929 the reference to announcement of special practice was deleted from the constitution.

The membership of the Society in its first five years of existence totalled forty-five, of whom fourteen were general surgeons who devoted themselves especially to the eye. After 1870 or thereabout, no general surgeon was elected to membership, and in 1884 the Society voted that

candidates for membership must have been engaged in the practice of ophthalmic surgery for at least five years.

The American Ophthalmological Society has performed most important services for advancement of the specialty, although its leadership in this respect has steadily diminished during the past quarter of a century. When, in 1915, the American Board of Ophthalmology (then the American Board for Ophthalmic Examinations) was founded, every one of the nine members of the Board was a member of the American Ophthalmological Society, although three of them were elected from the Academy and three from the Section of Ophthalmology of the American Medical Association. By virtue of its name and of its historical position in the profession, the Society has acted for the United States in arrangements for international ophthalmological congresses.

The Society has always extended a most cordial welcome to visiting colleagues, although such a welcome can hardly be expected to count very heavily at meetings held (as is usually the case) in eastern summer resorts remote from the large centers of population.

The Society's programs are usually interesting and stimulating. "From the beginning" (as was written twenty years ago) "its transactions have reflected the interest of American ophthalmologists in the preponderance of short papers offering practical suggestions, or placing on record the chief features of striking cases."

Shortly before the American Ophthalmological Society came into existence the total population of the United States was 31,443,321, of whom an estimated nineteen million or so lived in the Atlantic Coast states. In 1896, the Atlantic Coast states were still represented by something like five sixths of the membership of the Society, although by that time those states contained less than two fifths of the population of the United States. Twenty years ago it was stated by a member of the Society that two thirds or more of its membership had always resided within two hundred miles of New York City.

It may be supposed that this situation was one of the factors which led to the creation of the Western Ophthalmological, Otological, and Laryngological Society, now and for many years known as the American Academy of Ophthalmology and Otolaryngology. Since the formation of the American Board of Otolaryngology (some nine or ten years after the founding of the American Board of Ophthalmology) practically the only requirement for membership in the Academy has been the possession of a certificate from either the ophthalmologic or the otolaryngologic board. It is not surprising, therefore, that the membership of the Academy, under vigorous and progressive leadership, has grown in proportion to the growth of special practice and to the general development of medical science, amounting today to approximately 2800.

The constitutional limit to the number of members in the American Ophthalmological Society is now 225, and the active membership of the Society at the opening of this year's meeting was 183. It is difficult to escape the conclusion that the contrast between the numbers of members in the two organizations is in large degree a measure of a difference in usefulness which reflects to the disadvantage of the older organization.

In point of fact, the American Ophthalmological Society, a small, relatively exclusive, and predominantly local group, can hardly now be regarded as truly representative of the profession of ophthalmology in the United States.

The Society resolved in 1878 that resi-

dence in Canada was "no disqualification for membership." Today Canada is represented by only five members of the Society (four in Montreal and one in Toronto), although the Dominion has a population of over ten million.

The population of the continental United States is now well over 120 million. The center of population has moved steadily westward and is at present somewhere near the western boundary of Indiana. Of the 183 regular members of the Society at the opening of this year's meeting, 116 reside in the Atlantic Coast states, although those states now have only five twelfths of the total population of the country. The state of Texas (population over six million) has only two members, Indiana (nearly three and a half million) three members, Ohio (toward seven million) six members, and California (six million) seven members.

Let us compare these figures with analogous information for several other civilized countries.

Great Britain has a population of about forty-five million. Its national ophthalmological society, the Ophthalmological Society of the United Kingdom, accepts "all medical practitioners whose qualifications are satisfactory to the Council of the Society." Applications, signed by at least three members, are submitted to the Council, and if approved the applicant is admitted to membership forthwith.

The annual volume of transactions of the Société Française d'Ophtalmologie states no restrictions as to membership but lists a total of 1120 members.

The constitution of the Deutsche Ophthalmologische Gesellschaft (Heidelberg Congress) provides (according to the latest volume of transactions available to the writer—that for 1932) that applicants for membership shall apply to the board of directors through the secretary. There were 760 members in the year 1932.

The annual volume of transactions of the Società Italiana di Oftalmologia for 1927 (latest volume available) showed several kinds of membership, including a corresponding membership without vote in the affairs of the Society; and listed a total membership of 316.

Other national societies might be mentioned, such as those of Belgium and Egypt, each of which has a broad basis of membership. It may be said that nearly every ophthalmological society regarded as national is without numerical limitation of membership, and encourages the admission of all reputable ophthalmologists. Looking from these other countries toward the United States, a critical observer might perhaps inquire why our great federation of commonwealths, marching as it does in the vanguard of medical progress, has no purely ophthalmological society which can fairly be regarded as national in membership.

Some years ago the first editor of this Journal said: "Pretty much all that the greatest leaders of thought learn they learn through contact with their inferiors. . . . It is this getting out of ourselves, seeing things with other eyes . . . somewhat differently from our own, that is the essential of intellectual growth. . . . The great leaders of ophthalmology have become great through contact, first with fellow students and teachers and still more from contact with those who come to learn of them."

Can a society be truly national which does not favor to the utmost these professional contacts by which all of us ought to thrive? The members of the American Ophthalmological Society are entitled to make what they will of their organization. They may think of membership in the Society as a mark of quality which is to be limited forever to a few, but why should a national society, or one with a national title, be so conducted, as to mem-

bership and place of meeting, that it leaves great areas of the country either entirely or almost unrepresented?

A recent proposal to require ten years of practice in ophthalmology before election to membership in the Society would tend to exclude the worthiest and best trained of young ophthalmologists during their most formative years, the years when they are most likely to contribute worthwhile research.

There is room in the United States for a truly national society (or a society representative of the United States and Canada) whose purposes shall include every possible facility for improvement in professional training and contact. Much useful work of this kind has been accomplished by the American Academy of Ophthalmology and Otolaryngology. But, in view of the growing tendency to dissociate the two specialties, would it not be more appropriate for such undertakings to be in the hands of a separate ophthalmological organization? Is it too late to hope that the American Ophthalmological Society may cease to be (what it now is) one of the most exclusive important medical organizations in the world; and that it may awaken to far greater opportunities for service than it has hitherto contemplated?

W. H. Crisp

EYESTRAIN OR EYE STRESS

The publication of Donders's "Accommodation and Refraction of the Eye" directed attention to symptoms which use of the eyes may cause in other parts of the body. Studying the subject in patients who came to him for nervous diseases, S. Weir Mitchell recognized these symptoms in many patients and wrote of them as due to "eyestrain." Stress means, according to the dictionary, "force exerted to, or beyond, the point of strain." Timber subjected to stress may bend and recover its form when the stress is removed. Transparent substances, like glass, under stress act differently on light. Nerve stress, started by excessive or prolonged use of the eyes, may manifest itself by the disturbance of organs not directly concerned in vision. The autonomic nervous system, regulating the action of many organs in the body, especially the endocrine glands, can inhibit the action of some or make excessive the action of others. This part of physiology is so imperfectly known that it is easily overlooked and forgotten.

The stress of accommodation, produced by errors of refraction, poor light, or excessive use of the eyes, has demanded the attention of nearly all ophthalmologists. But the more obscure effects of such stress are very often overlooked. At first, it was assumed that the high degrees of ametropia, and particularly those that cause marked impairment of vision, were the most important; but that low degrees might be disregarded. Dr. George M. Gould, in his volumes of "Biographic Clinics," emphasized the important part played by errors of refraction in the lives of famous men. He pointed out that it was not so much the amount of the error as the effect of continuous, or prolonged, stress to correct it that determined its disastrous influence on the general health. He collected the biographies of many famous men and women, writers, students, and musicians that gave abundant evidence of the harm done by what he called "eyestrain." But in spite of Gould's writings the medical profession has failed to recognize the wider field of symptoms and disabilities that come from excessive use of imperfect eyes. It is, therefore, important to bring to the attention of ophthalmologists well-observed cases of ill health due to eye stress that

have been watched for a sufficiently long time to prove the effects of dysfunction, and to corroborate the observation by the disappearance of symptoms after exact correction of low degrees of astigmatism. The reader who thinks he can ignore the subject of eyestrain, of which he has heard so much, simply proves that he does not know the importance of the subject. Only time can tell how much more reiteration may be needed to convince ophthalmologists of the importance of the accurate correction of refraction, and avoidance of accommodative and convergence strain of the eyes. Until these things are understood there is no more important subject that can be brought to the attention of ophthalmologists.

Edward Jackson.

OUT-PATIENT SERVICE

Probably most ophthalmologists have some connection with a clinic and will therefore be interested in the paper in this issue on "Standards for out-patient service in ophthalmology" as approved and accepted in the New York Academy of Medicine in 1938. The general soundness of the report will be evident at once. Some of the details seem to the reviewer from his standpoint as a departmental head to be deserving of special comment.

Whether in private practice or in a clinic the patient likes a close personal association with his physician. He wants to consider him a friendly and not an impersonal adviser. The day of the automat in medicine has fortunately not yet arrived, and while the possibility of intimate personal contacts still exists let the most be made of it. Hence the point of referring patients on revisits back to the physician who originally examined them is important. This is not always so easy as it sounds, for the patient may return on the wrong day or the particular doctor who examined the patient previously may have his hands full with something else. However, it pays in the added satisfaction given to have a sincere effort made to accomplish this.

A similar point, not mentioned perhaps because so obvious, is the holding inviolate of an appointment with a patient. The interne, being young, often thoughtless, and unconscious of the physical and financial sacrifice usually made by clinic patients in attending the dispensary, if he happens to have something that interferes with his appointment, such as assisting with an unexpected operation, sudden demand for a special refraction, or recording visual fields, is apt casually to direct the clinic clerk to tell the patient that he cannot be seen that day and that he must make another appointment. Although his clinic-admission fee may be returned, the patient is usually out his carfare and the half-day that he has taken from his work.

The standard nomenclature of diseases is suggested. This has now been in use in the writer's clinic for about five years and is well liked by the staff and the secretaries who handle the cross-indexing. The change over from an older system was somewhat difficult, and it was found that a considerable number of gaps had to be filled in, but the new system is working better than the old.

A periodic review of the work done in the clinic is suggested. This is really essential. Like a spring clock, the conduct of a clinic simply must be wound up every once in a while, as it runs down. This is particularly true in regard to the records. At first they are full and informative, but gradually they tend to become brief and less valuable until the individual must be stimulated to do better.

A special department for research is

suggested. This may be successful in some institutions, but usually it is most difficult to combine research—unless one includes the reporting of clinical cases in this category—and work in the out-patient department. True research requires such a great amount of time that few men can do this and attend the out-patient department unless they are on "full time" in an organization and not trying to engage in private practice.

A point that might be stressed is giving to the house staff an adequate course of systematic instruction. More and more the value of this is being appreciated and, in fact, demanded by the applicants for staff positions. The theory of self-instruction may be justified in a few instances, but the vast majority of students are incapable of educating themselves adequately without direction and supervision.

Finally, regarding the distribution of patients who are able to pay for private service, the remuneration from them rarely amounts to anything, but often the staff thinks that it is very valuable; so the greatest care should be taken to make sure that this distribution is made according to the desire of the staff and that the records are always available to them. This simple method creates a feeling of confidence and satisfaction in the staff and this in turn makes for the success of the entire out-patient department.

Lawrence T. Post.

BOOK NOTICES

TRANSACTIONS OF THE PACIFIC COAST OTO-OPHTHALMOLOGICAL SOCIETY, 1938. Twenty-sixth annual meeting, Victoria, B.C. Cloth-bound, 205 pages, illustrated.

This volume conforms to the style of previous Transactions of this Society. It indicates that the idea of instruction courses has been utilized again by the Society and apparently has been welcomed in a manner similar to that accorded the courses given by the Academy —which is without doubt the most attractive feature of the Academy to its membership. What the ultimate outcome of these various instructional courses given in numerous places in the country will be remains to be seen; for one reason because it is undoubtedly a great strain on the ophthalmic-teacher group of the country.

The ophthalmic program was as follows: Problems in the diagnosis of abscess and tumor of the orbit, by William L. Benedict; Corneal cautery for conic cornea and corneal astigmatism, by Roderic O'Connor; Mucous membrane grafts in ophthalmic conditions, by Harold F. Whalman; The sympathetics of the head region, by O. Larsell (Ph.D.); Recurrent iritis, by E. Merle Taylor; The results of squint operations —A report of the last 286 cases at the University of Oregon Clinic, by Frederic A. Kiehle and G. H. Henton; The eye and ear in orientation and balance, by Edward Jackson; Nematode worm in the anterior chamber of the eye, by Clinton T. Cooke. The last-named is an interesting report of an occurrence rare in the West, illustrated with a colored reproduction.

Lawrence T. Post.

THE CLINICAL AND EXPERIMENTAL USE OF SULFANILAMIDE, SULFAPYRADINE AND ALLIED COMPOUNDS. By Perrin H. Long, M.D., and Eleanor A. Bliss, Sc.D. 319 pages. New York, The Macmillan Co. Price $3.50.

The introduction of sulfanilamide and related derivatives into clinical medicine has created an enthusiasm and confidence

rarely witnessed, at least in magnitude. The result is that medicine has become chemotheropeusis-conscious at a time when treatment of infections with chemical agents had receded to a low ebb. This consciousness has now assumed such proportions that it is more than possible that sulfanilamide will be remembered not so much for its therapeutic properties as for having furnished the incentive towards more effective and less toxic agents.

It is, therefore, at a timely occasion that this monograph is presented by two workers prominent in this field by their own right because a number of the original experiments were done by them and their knowledge of the literature is so complete. The book opens with a historical chapter—if six years can be considered history—tracing the development of sulfanilamide therapy. Then there are two chapters on essentially experimental information, the one describing treatment of experimental infection and the other enumerating toxic manifestations induced in various animals. There follows a thorough chapter on the mode of action of sulfanilamide and related compounds, in which 150-odd references are cited and in which the conclusion is drawn that "no theory has been evolved which adequately explains the mode of action and one must be content with the single conception that they inhibit the growth of susceptible microörganisms." The remainder of the book is devoted to the clinical uses of these sulfur-benzene compounds.

If the literature is estimated conservatively, it may be said that sulfanilamide is effective in streptococcal, meningococcal, and gonococcal infections. There are indications that this list may be enlarged, but at the present time the evidence is too meager and also contradictory. Sulfapyradine, on the other hand, will probably find its greatest usefulness in pneumococcal infections. The sections on sulfapyradine are perhaps premature, since reports are still in the process of publication, and it will take time to collect the incoming data.

The authors appear to be writing in a crusading spirit and to be distinctly inclined towards enthusiasm. Nevertheless, the monograph is well presented, it covers the literature thoroughly and fairly, and it has been written in a smooth and readable manner.

There is little doubt in this reviewer's mind that the entire subject is still in a state of flux and that time will reveal important and necessary additions and revisions. It is a rather common vagary of medical practice to greet enthusiastically a new treatment, with the first reports very favorable. The more conservative workers accumulate and assemble their data more slowly, and their reports are consequently late in appearance. So in this case time alone will provide the answer as to how effective this family of drugs is in the different infections, and what eventual harm will accompany the indiscriminate use of potentially toxic substances.

L. A. Julianelle.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP
ASSISTED BY DR. GEORGE A. FILMER

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy, embryology, and comparative ophthalmology

1

GENERAL METHODS OF DIAGNOSIS

Bangerter-Blaser, Katharina. **The value of slitlamp microscopy of the ocular fundus compared with other methods of fundus study.** Ophthalmologica, 1939, v. 96, Jan.-Feb., p. 224.

The author presents a series of studies of the fundus oculi of 42 patients as explored by the following methods: (1) direct and indirect ophthalmoscopy, (2) red-free ophthalmoscopy according to Vogt, (3) with the large Gullstrand ophthalmoscope, and (4) with contact glass and slitlamp. The study indicated that examination with slitlamp and contact glass could supply valuable supplementary details and in some instances make clear an otherwise obscure diagnosis. F. Herbert Haessler.

Ferree, C. E., and Rand, G. **Higher visibility in a roentgenogram illuminator.** Arch. of Ophth., 1939, v. 21, Jan., pp. 70-75.

The amount of light needed to give the highest power of discriminate detail varies with the person making the examination and the density of the roentgenogram. An illuminator was devised to give a variation in the intensity of light in continuous series from zero to full, without change in the color or composition of the light, by means of a rotatable shutter the contiguous vanes of which turn in opposite directions. (Illustrations.) J. Hewitt Judd.

Juler, F. A. **A projection scotometer.** Brit. Jour. Ophth., 1939, v. 23, April, pp. 239-242.

The author here describes an apparatus he has used in clinical experimental work for more than a year and reports its advantages over ordinary methods with screen and discs on holders. This apparatus overcomes the handicaps of sound and sight of the carrier in the usual methods of procedure. The illustration accompanying the article demonstrates the use of the apparatus. D. F. Harbridge.

Kaminskaja-Pavlova, Z. A. **The "crawling ray" in biomicroscopy.**

Viestnik Opht., 1939, v. 14, pt. 4, p. 53.

To the standard methods of slitlamp illumination, the author adds a new method, which she designates as "crawling illumination." It consists in placing the slitlamp perpendicularly to the temple and moving the ray thus formed slowly across the cornea. This illumination, she claims, facilitates the examination of the lens and brings out fine changes on the surface of the iris not demonstrable otherwise.

Ray K. Daily.

2

THERAPEUTICS AND OPERATIONS

Berens, Conrad. **Iridocapsulotomy scissors.** Amer. Jour. Ophth., 1939, v. 22, May, pp. 543-544; also Trans. Amer. Ophth. Soc., 1938, v. 36, p. 281.

Biontovskaja, E. T. **The use of lysozyme in ophthalmology.** Viestnik Opht., 1939, v. 14, pt. 1, p. 44.

To determine the effect of lysozyme on infectious ocular diseases, and to analyze its stimulative, regenerative, analgesic, and lytic properties it was used in 75 clinical cases and in 31 laboratory tests. The conclusions are that in severe purulent keratitis the effect of lysozyme is negative; in young patients staphylococcus ulcers respond favorably to lysozyme treatment; in pneumococcus ulcers the reaction is negative and the gravity of the infection contraindicates temporizing and calls for prompt energetic measures. In acute conjunctivitis lysozyme is not useful; but it seems to have a good influence on gonoblennorrhea. In three cases of eczematous dermatitis of the lids and in a burn the results were good. The author concludes that in the majority of cases the therapeutic effect of lysozyme is negative; its regenerative action is doubtful, but it apparently possesses analgesic properties. Clinically and in the laboratory its bactericidal action was negative in the majority of cases, the staphylococcus being less resistant than the pneumococcus.

Ray K. Daily.

Corelli, F., and Ciotola, G. **Desensitizing therapy in ocular allergic forms.** Boll. d'Ocul., 1938, v. 17, June, pp. 444-451.

The authors report in tabulated form fifty patients aged from nine to 62 years affected by eye diseases whose etiologic factor showed an allergic component. They were treated with an aspecific desensitizing therapy used by Corelli in general medicine and consisting of intravenous injections of a solution containing hyposulphite of magnesia, calcium chloride, and glucose. Good results were noted in blepharoconjunctivitis, some forms of keratitis, and eczema of the lids. The article closes with a discussion on the mechanism of action of this therapy. (Bibliography.)

M. Lombardo.

Cornet, Emmanuel. **Flexible borated collodion used as a dressing.** Revue Internat. du Trachome, 1939, v. 16, Jan., p. 47.

The author, noting that the tears and conjunctival secretion often cause breaking down of operative wounds, suggests that flexible borated collodion be applied to the wound. He omits the occlusive bandage.

J. Wesley McKinney.

Grosz, Stefan. **The importance of vitamin B in ophthalmology.** Graefe's Arch., 1939, v. 140, pt. 1, pp. 149-170.

It has been demonstrated that in the administration of vitamin B_1 it must usually be accompanied by B_2, since part of the factors of the B group only

exert their action together. Vitamin B_1 is chiefly important in inflammation of the optic nerve of the alcoholic type, and also in other toxic or metabolic amblyopias. These conditions are really hypovitaminoses (an increased demand or poor absorption). The tobacco-alcohol toxic amblyopia is not entirely due to avitaminosis, but the optic nerves are attacked by tobacco and alcohol because they are suffering from a lack of vitamins. It is fundamentally important that the further use of tobacco and alcohol be prohibited. In this first group, the B therapy has only a substitutional character. In the second group, the treatment with vitamin B in acute retrobulbar neuritis from multiple sclerosis, in tabetic optic atrophy, in paralysis of the ocular nerves from different factors, and in the postdiphtheritic paralysis of accommodation is still in the experimental stage. The third group includes uveitis of uncertain origin, and diseases of the eyelids, hordeolum, rosacea, and phlyctenulosis. A hypovitaminosis is assumed to be present here also. In the fourth group, a soothing action with B_1 is possible in cases of corneal herpes and principally in herpes zoster. Here the vitamin acts as a remedial agent and not as a substitutive agent in a deficiency disease. Indications for B_2, in addition to the diseases of groups one and two are phlyctenulosis, pernicious optic atrophy, and Adie's syndrome (in the latter accompanied by B_1). H. D. Lamb.

Harman, N. B. **A pin eye-dropper.** Brit. Jour. Ophth., 1939, v. 23, March, p. 212.

This describes a pin fastened to an appropriate handle. By dipping the head of the pin into oily solutions a very small globule can be transferred to the eye. (Illustration.)

D. F. Harbridge.

Heath, Parker. **Anterior-chamber irrigator.** Arch. of Ophth., 1939, v. 21, Feb., p. 359. (See Amer. Jour. Ophth., 1938, v. 21, Nov., p. 1295.)

Horner, W. D. **A special solvent dispenser for the removal of adhesive-plaster dressings.** Amer. Jour. Ophth., 1939, v. 22, May, p. 541.

Kirby, D. B. **Suture material for ocular operations.** Amer. Jour. Ophth., 1939, v. 22, May, p. 544; also Trans. Amer. Ophth. Soc., 1938, v. 36, p. 279.

Klar, R. **Investigations on the velocity of sedimentation of the blood corpuscles before and after eye operations.** Klin. M. f. Augenh., 1939, v. 102, March, p. 321.

Observations on 100 patients showed no acceleration of the sedimentation time after intraocular or extraocular operations. The author believes that the small extent of wound surface is the chief reason. C. Zimmermann.

Satz, L. B., and Medvedjev, H. I. **Clinical observations on Schick's method of injecting blood into the anterior chamber for ocular diseases.** Viestnik Opht., 1939, v. 14, pt. 1, p. 61.

From experience with nine clinical cases it appears that the procedure is harmless, and influences favorably the course of the disease in tuberculous and infectious diseases of the anterior ocular segment. Ray K. Daily.

Sharkovski, I. A. **Dry gangrene as a complication of adrenalin medication.** Viestnik Opht., 1939, v. 16, pt. 1, p. 116. (See Section 16, Injuries.)

Stallard, H. B. **A new needle holder.** Brit. Jour. Ophth., 1939, v. 23, May, pp. 330-331.

A needle holder designed for use in

ophthalmic operations is described. (Illustrations.) D. F. Harbridge.

Talkovskii, C. I. **Pathogenesis and therapy of scrofulous eye diseases.** Viestnik Opht., 1939, v. 14, pt. 4, p. 44.

The author is very enthusiastic about intramuscular injections of thymol and cod-liver oil. Of the patients examined 53 percent were found to have ascarides, for which the thymol is effective. A tabulation of 68 clinical cases supports the author's theory.

Ray K. Daily.

Traquair, H. M. **Anesthesia in ophthalmic surgery.** Trans. Ophth. Soc. United Kingdom, 1938, v. 58, pt. 2, p. 697.

A review of the local anesthetics, instruments, and methods, and the technique for special operations are given. Premedication is discussed as well as the limitations of local anesthesia.

Beulah Cushman.

Venco, L. **The appearance of sulphanilamide in the lacrimal fluid, in the aqueous, and in the vitreous after administration of the organic derivatives of sulphur; and its antibacterial action.** Ann. di Ottal., 1939, v. 67, Jan., p. 30.

The author by means of color reactions has attempted to determine the presence of sulphanilamide in the lacrimal fluid of individuals treated with sulphanilamide and its combinations. He describes the technique employed in his experimental research conducted on rabbits, and discusses the determination of sulphanilamide in the ocular humors following its gastric ingestion, and the bactericidal action of the drug. (Bibliography.) Park Lewis.

Yanes, T. R. **The art of therapy in ophthalmology.** Rev. Cubana de Oto-Neuro-Oft., 1938, v. 7, July-Oct., p. 81.

A comprehensive article dealing with methods and drugs employed in the treatment of diseases of the eye. A discussion of the various types of ophthalmic drugs, such as antiseptics, miotics, and cycloplegics, is given in some detail with recommendations as to the manner of their employment, dosage, toxicity, and incompatabilities. Procedures in the general treatment of eye disease and ocular physiotherapy are also given. Edward P. Burch.

3

PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Baevski, I. L. **Vision of sharpshooters.** Viestnik Opht., 1939, v. 14, pt. 1, p. 126.

A controversial comment.

Bari, Enzo di. **Partial amblyopia in the astigmatic eye as revealed and measured by the di Bari quadrant resolvimeter.** Boll. d'Ocul., 1938, v. 17, Sept., pp. 785-795.

The author describes his apparatus and its use in determining and measuring this type of amblyopia. He reports such cases to show that the meridian of greater amblyopia coincides with the axis of the correcting cylinder.

M. Lombardo.

Berens, Conrad. **Prism scale for use at 50 centimeters.** Amer. Jour. Ophth., 1939, v. 22, May, pp. 542-543; also Trans. Amer. Ophth. Soc., 1938, v. 36, p. 280.

Berens, C., and Loutfallah, M. **Aniseikonia: a study of 836 patients examined with the ophthalmo-eikonometer.** Amer. Jour. Ophth., 1939, v. 22, June, pp. 625-641; also Trans. Amer. Ophth. Soc., 1938, v. 36, p. 234.

Bucalossi, Antonio. **An evaluation of the polychromatic stimuli and the physical and physiologic causes of im-**

perfect discriminating power in the eye. Ann. di Ottal., 1939, v. 67, Feb., p. 93.

The chromatic function of the eye is generally considered to have reached a high degree of perfection in its discrimination of tone, intensity, and saturation. The trained eye, such as that of a painter, can generally match observed colors so that they cannot be distinguished apart. By means of certain tests, however, it may be demonstrated that the human color sense is far from perfect; it is well known that aberrations in both form and color are present. Through a complicated series of physical, chemical and biologic phenomena, the eye possesses the power of modifying the nerve impulse carried to the visual center. These differences, while demonstrable, usually pass unnoticed and cause no disturbances in visual sensibility. Failure to perceive chromatic aberration is due to the fact that the eye is focused for the more intense light; other rays forming circles of diffusion are unnoticed, the eye being able to accommodate itself only for rays of the same wave length.

A purely physiologic function is also involved. Pure colors do not appear in nature. Only to a certain point is the eye capable of responding to color stimuli other than that which is dominant. Colors in nature are complex and the eye is trained to respond only to the combined stimuli and not to individual stimuli arising from the substances of which the object is composed.

Park Lewis.

Burian, H. M. **Fusional movements; rôle of peripheral retinal stimuli.** Arch. of Ophth., 1939, v. 21, March, pp. 486-491; also Trans. Sec. on Ophth., Amer. Med. Assoc., 1938, 89th mtg., p. 202.

The method described permits stimulation of any desired areas of the two retinas with identical stimuli whose relative position, size, shape, and brightness can be controlled. Studies were conducted to learn how identical objects imaged on strictly peripheral disparate points of the retina affect the relative position of the two eyes. The displacement was accomplished by an arrangement of several projection lanterns, and polarizing material in front of the lanterns and the apertures for the observer. Vertical displacements were studied and the measurements obtained showed a high degree of accuracy. It was found that powerful, fusional stimuli are exerted by peripheral retinal areas, that these stimuli affect the relative position of the eyes, and under certain conditions even cause a loss of central fusion. J. Hewitt Judd.

Cantamessa, Gustavo. **The phenomenon of the eye in darkness and twilight vision.** Boll. d'Ocul., 1938, v. 17, June, pp. 492-493.

The writer, while looking at a multicolored carpet in diffuse light, covered one eye for a period of time. On uncovering the eye he noted that the colors, especially red and yellow, appeared to have a very warm tone to this eye while all colors appeared to have a cold tone to the other eye. He discusses this phenomenon and concludes that stimulation of the chromatic sense depends upon chemical substances which are destroyed by light and reform in the dark. In order that color perception be effected, color radiations must occur in sufficient quantity and intensity, otherwise a non-colored sensation is produced. The eye in the dark has a more vivid perception for colors. At twilight the cones acquire a greater chromatic sensibility since the rods are more sensitive to the non-colored light.

M. Lombardo.

Cogan, F. C., and Cogan, D. G. **Recovery time from color fatigue in the peripheral visual field.** Ophthalmologica, 1939, v. 96, Jan.-Feb., p. 267.

A method is described for measuring recovery time from a colored stimulus in the peripheral field. When magenta red is the primary stimulus, a dark-gray secondary stimulus causes recovery at a higher level, but in the same time as a light-gray one. A complementary green of the same brightness as gray shows the same recovery time. The recovery period is shorter at 30 degrees than at 10 degrees and movement of the eyeball has no effect on recovery time.

F. Herbert Haessler.

Dean, F. W. **Frequency of phorias, importance of prism correction.** Arch. of Ophth., 1939, v. 21, March, pp. 511-512.

In the first group of 10,000 patients, 574 were given prisms for the correction of esophoria, 613 for the correction of exophoria, and 288 for the correction of hyperphoria. Prisms were found to be of benefit for exophoria and hyperphoria but not for esophoria, and their use in this condition was discontinued. In the next group of 8,000 patients prisms were used for correction of hyperphoria in 577, and for exophoria in 1,328. In the third group of 3,000 patients prisms were prescribed in 285 for hyperphoria, and in 223 for exophoria. The author reports that the wearing of prisms did not cause a change in the amount of the phoria, but that the patients with exophoria and hyperphoria were very much more comfortable with their phorias corrected. J. Hewitt Judd.

Doesschate, G. Ten, and Fischer, F. P. **Representing and observing perspective.** Ophthalmologica, 1939, v. 97, April, p. 1.

The authors analyze the effects of perspective drawings and elucidate their ideas by means of many diagrams. They show that the rules of constructive perspective alone are not adequate for perspective representation. Physiologic and psychologic factors must always coöperate to give an idea of space.

F. Herbert Haessler.

Eggers, Harry, **Aids in the fitting of contact lenses.** Arch. of Ophth., 1939, v. 21, April, pp. 647-649.

The usual procedure may be shortened by the elimination of the ophthalmometric determination and by the substitution of an instantaneous formula for the graph and table. Additional spherical power in a trial frame may be converted rapidly into an equivalent larger or smaller corneal radius in the contact lens by means of two empiric formulas, one for myopic and the other for hypermetropic patients. These formulas were made up from data obtained in examination of 152 patients. J. Hewitt Judd.

Ferree, C. E., and Rand, G. **Testing fitness for night flying; speed of change of adjustment of the eyes for intensity of light and distance of object.** Amer. Jour. Ophth., 1939, v. 22, June, pp. 655-660.

Kompaneiski, B. H. **Depth perception. An analysis of the theory of stimulation of disparate points.** Viestnik Opht., 1939, v. 14, pt. 1, p. 90.

The detailed report of a laboratory investigation shows that there is a threshold of fusion of images from disparate retinal points, and that it can be calculated mathematically. Fusion of afterimages of two not-quite-corres-

ponding retinal points stimulated alternately, shows that convergence is not a factor in depth perception, as long as the distance between the two objects is less than the threshold of fusion. Tests with two stereoscopic objects, and one object in front of these seen by one eye only, show that convergence plays no part in judging the distance of the single object, which is seen at the same distance as the stereoscopic object. Perception of irregularly placed objects demonstrates the existence of a zone of fusion in the retina. The perception of stereograms moved in opposite directions also proves that convergence is not a factor in depth perception.

Ray K. Daily.

Kravkov, S. V. **The influence of caffeine on color sensitivity.** Acta Ophth., 1939, v. 17, pt. 1, p. 89.

This investigation deals with the effect of caffeine on the ocular sensitivity to the red and green portion of the spectrum. The data obtained show that it is increased. The effect of the drug appears twenty minutes after its ingestion and lasts forty minutes. The maximum increase in color sensitivity was 40 percent. Ray K. Daily.

Krimsky, Emanuel. **Psychologic considerations in the study of binocular function.** Arch. of Ophth., 1939, v. 21, April, pp. 662-670.

This discussion includes the meaning of fusion, duction readings in relation to psychologic influences, the meaning of stereoscopic pictures, the requisites of a binocular instrument with a critical analysis of methods used in binocular study and training, what to expect from orthoptic training, the rôle of technician or orthoptist, and orthoptic training as a problem for the ophthalmologist. A comprehensive plan for closer coöperation between clinician and psychologist is suggested. (Discussion.) J. Hewitt Judd.

Lowe, G. B. **A bicylindrical type reader.** Brit. Jour. Ophth., 1939, v. 23, March, pp. 212-213.

This is a description of a new type hand reading glass. Two plano-cylinders of six diopters each lie back to back on the horizontal furnishing a power of twelve diopters. Legibility is increased through an increase in the height of the letters. A black etched line across the lower third of the lens furnishes a guide for an actual vertical reading. The glass is recommended for those, especially the aged, with damaged macular perception, and for those with obstructions in the media whether in the cornea, lens, or vitreous. (Illustrated.) D. F. Harbridge.

Luckiesh, M., and Moss, F. K. **Frequency of blinking as a clinical criterion of ease of seeing.** Amer. Jour. Ophth., 1939, v. 22, June, pp. 616-621.

Maisler, S. **Casts of the human eye for contact lenses.** Arch. of Ophth., 1939, v. 21, Feb., pp. 359-361.

Molds of the eye can be made more quickly with the new gel known as Kerr's hydrocolloid applied in a special silver molding shell. To enhance the rapid setting or chilling of the gel, a double-chambered shell and handle with an upper inlet and a lower outlet for quick cooling with ice water can be used. Casting is done with a French dental plaster soon after the mold is obtained, because some shrinkage may take place if the mold is exposed to air too long. J. Hewitt Judd.

Ogle, K. N. **Induced size effect. 2. An experimental study of the phenomenon with restricted fusion stimuli.** Arch. of Ophth., 1939, v. 21, April, pp. 604-625.

This phenomenon, in which an apparent rotation of the binocular field occurs when a meridional size lens is placed before one eye so as to change the size of the retinal image in the vertical meridian only, was studied by using simpler and restricted fusion patterns in order to obtain a finer analysis. It was found that the introduction of a difference in the sizes of the images in the vertical meridian did not cause an induced size effect unless there were at least two separated vertical contours in the binocular visual field. This difference in the sizes of the images for the maximum induced size effect decreases with increasing separations of the fusion contours. The magnitude of the maximum induced size effect decreases with increasing angular distances of the fusion contours from the fixation point. The maximum sensitivity (the apparent rotation of the binocular visual field for a 1-percent difference in the sizes of the images at the center of symmetry) varies with the observers and with the patterns but is nearly constant for different visual angles subtended by the fusion contours. J. Hewitt Judd.

Olsho, S. L. **Vertical prism imbalances in bifocal lenses coexistent with hyperphoria.** Arch. of Ophth., 1939, v. 21, March, pp. 515-521.

The method for estimation of the vertical prism imbalance caused by the differences in the vertical effective powers in lenses is described. Consideration of this will prevent the prescribing of lenses which produce an excessive vertical imbalance and will permit the correction of hyperphorias within limits which can be tolerated.

J. Hewitt Judd.

Pascal, J. I. **An aid toward correctly inserting contact lenses.** Arch. of Ophth., 1939, v. 21, March, pp. 513-514.

To facilitate correct orientation of the glass during its application, the rubber sucker used for inserting the contact glass is marked with a white stripe to correspond with the fine etched line on the lens.

J. Hewitt Judd.

Píša, Antonin. **The binocular visual range in domestic animals.** Graefe's Arch., 1939, v. 140, pt. 1, pp. 1-54.

The writer's axoperimeter based upon the principle of the binocular perimeter of Tschermak-Seysenegg is described. This instrument is used to measure the extent of the binocular visual range by means of transcleral images, and also to determine the ocular axes by use of the central and peripupillary reflex. The animals measured were rabbits, guinea pigs, fox terriers, pointers, greyhounds, rattlers, goats, cattle, and horses. Systematic measurements of the extent of the binocular visual range in these animals are carefully tabulated. The position of the ocular axes is characterized by the spherical geographic coördinates. From these, the divergence of the ocular axes and the elevation of the plane of the ocular axes are determined. Curves formed by movements of the vertex of the cornea with regard to the range of orientation of the head and with regard to movements of the ocular axes are given for most of the animals studied.

H. D. Lamb.

Rabkin, E. B. **Binocular spectral anomaloscope.** Viestnik Opht., 1939, v. 14, pt. 1, p. 84.

A description of an anomaloscope which permits the determination of the threshold of perception for the entire spectrum and for each chromatic component separately. The intensity of the

color can be varied through a system of diaphragms, and the eyes can be tested monocularly and binocularly. (Illustrations.) Ray K. Daily.

Scardaccione, Mario. **Researches on the action of the melanophore hormone (intermedine) on the adaptation time to darkness and luminous excitability in the normal individual and in retinitis pigmentosa.** Boll. d'Ocul., 1938, v. 17, Sept., pp. 755-775.

Investigating the effect of intermedine (prepared from the median and posterior lobe of the hypophysis) on the eyes of Scardinius erythophthalmos and of Rana aesculenta, the writer determined that in all cases the preparation provokes expansion of the chromatophores and a tendency of the pigment to dispose itself toward the position found in dark adaptation. Other observations showed that this hormone shortened the dark-adaptation time and the luminous excitability both in normal persons and in cases of retinitis pigmentosa. (Bibliography.) M. Lombardo.

Schubert, G. **The aniseikonia question.** Graefe's Arch., 1939, v. 140, pt. 1, pp. 55-60.

Aniseikonia which occurs in asymmetrical convergence under definite conditions of haploscopic sight is due either to an asymmetry of the image-producing apparatus of the eyes or to an asymmetry of the subjective-test object. In the observed subjective similarity of images, there exists no compensatory mechanism which with asymmetric convergence produces an unequal size of images when an object is observed with both eyes. Through the presentation of two equally sized and equally distant but incongruous objects (circle and quadrant), fusion is only made more difficult. Not only are the half images not united as a single image, but these images by binocular observation with asymmetric convergence do not even appear to be at the same distance. Therefore the image for each eye must appear to be of a different size. The phenomenon of this latter aniseikonia cannot therefore be used, as was claimed, for the determination of the functional size of the image for each eye. H. D. Lamb.

Shagov, M. A. **A device for testing visual acuity**. Viestnik Opht., 1939, v. 14, pts. 2-3, p. 111.

A description of an illuminated test box. (Illustrations.) Ray K. Daily.

Sjörgen, Henrik. **A new series of test cards for determining visual acuity in children.** Acta Ophth., 1939, v. 17, pt. 1, p. 67.

The test object consists of the design of a hand constructed on the Snellen principle. The merit claimed for it is that even two-year-old children can respond to it. (Illustrations.) Ray K. Daily.

Vannas, M. **An improved trial frame.** Acta Ophth., 1938, v. 16, pt. 4, p. 595.

The improvement consists in attaching the occluders to the frame. (Illustration.) Ray K. Daily.

Waugh, D. D. **A combination of the Snellen and the Landolt test types.** Arch. of Ophth., 1939, v. 21, April, pp. 671-672.

The combination is obtained by using a circle subtending a visual angle of three minutes, having a central aperture of 1-minute angle. This letter "o" is transformed into a "q" by the addition of a 1-minute stem below and to the right of the "o." A 1-minute stem below and to the left makes the letter "p," and so on. A break in the circle

subtending a 1-minute angle makes the letter "u" or "c," and with the 1-minute stem added, forms a "y," "f," or "h." However, some patients would have difficulty in interpreting the letters.

J. Hewitt Judd.

Wincor, H. G. **New scissors for enucleation.** Arch. of Ophth., 1939, v. 21, April, p. 672.

By means of an elevation on the anterior blade of approximately 6 mm. this type of scissors insures obtaining a portion of the nerve with the globe, and the globe is protected from being cut or injured. J. Hewitt Judd.

Wright, W. D., and Granit, R. **On the correlation of some sensory and physiological phenomena of vision.** Brit. Jour. Ophth., 1938, monograph supplement 9, 80 pages.

The subject matter of this monograph divides itself into three sections: the physiological side represented by recent work on photochemistry and electrophysiology; fundamental sensory phenomena of vision (stressing the correlations which seem reasonably evident); and the correlation of some sensory and physiological phenomena. Under the first section a discussion of anatomical facts involving the complicated retinal structures from a neurophysiological point is presented. Electrophysiological facts concerning excitation in the retina are elucidated by experiments in electroretinograms, electro-adaptation, fast and slow retina, forms of intersection, the rod spectrum, and the cone spectrum. Section two goes into the matter of sensory phenomena under the headings of static characteristics and dynamic characteristics, the discussion dealing with normal vision, luminosity, color, central and peripheral vision, directional sensitivity of retina, analysis of the color-perception mechanism, and other topics. Section three discusses the problem of discrimination, the time course of response, the color-perception mechanism, and related subjects. (Figures, references.) D. F. Harbridge.

Zaffke, K. H. **Normal curves of the dark adaptation in absolute threshold values with Birch-Hirschfeld's light-sense tester.** Graefe's Arch., 1939, v. 140, pt. 1, pp. 61-69.

The light-sense tester of Birch-Hirschfeld permits a comparison between the threshold stimulus of the patient and that of the observer. Therefore this apparatus permits only a measurement of the relative value of the threshold stimulus. The average normal curve of values for thirty normal individuals is plotted. With this curve, it is possible to determine absolute threshold values and to carry out with this apparatus reliable comparisons between normal and affected persons. H. D. Lamb.

4

OCULAR MOVEMENTS

Bender, M. B., and Weinstein, E. A. **Dissociated monocular nystagmus with paresis of horizontal ocular movements.** Arch. of Ophth., 1939, v. 21, Feb., pp. 266-272.

Three cases are reported in which there was paresis of lateroversion with paralysis of the internal rectus muscle and nystagmus only in the eye on the side to which the gaze was directed. The same ocular disturbances were produced in monkeys by sectioning the posterior longitudinal bundle at the level of the facial colliculi.

J. Hewitt Judd.

Bielschowsky, A. **Lectures on motor anomalies. 9. Oculomotor-nerve paraly-**

sis and ophthalmoplegias. Amer. Jour. Ophth., 1939, v. 22, May, pp. 484-498.

Bielschowsky, A. **Lectures on motor anomalies. 10. Supranuclear paralyses.** Amer. Jour. Ophth., 1939, v. 22, June, pp. 603-613.

Carow, Rudolf. **Observations on the rolling of the eyes in near and the elevation-depression rotation of the eyes.** Graefe's Arch., 1939, v. 140, pt. 1, pp. 86-115.

With the Harms cyclophorometer, 107 individuals were measured as to rotation of the eyes at near and the elevation-depression rotation. The rotation at near always consisted of a movement of declination of both eyes, usually increasing the declination of the longitudinal middle plane of the primary position. Elevation of the plane of sight was present only in mild degree in distance, but was increased with a rotation of the eyes outward at near. Depression of the plane of sight resulted in a diminution of the outward rotation of the eyes. In each case, the near and the elevation-depression rotations of the eyes were not uniform. Their origin is apparently dependent upon individually different anatomic and innervatory peculiarities. These reactions seem to be not so much extra rotations as heterophorias in the broadest meaning of the word. H. D. Lamb.

Jaensch, P. A. **The operative treatment of isolated binocular paresis of the trochlearis.** Klin. M. f. Augenh., 1939, v. 102, March, p. 305.

A man of 33 years fell from a tree and suffered concussion of the brain with loss of consciousness for twelve hours. After a few days he noticed disturbing diplopia caused by an isolated paralysis of both superior oblique muscles. Recession of the inferior recti in two sittings was ineffective. Indications for this and other operations (myectomy of the inferior oblique) are discussed. This case illustrates the great difficulty of curing diplopia due to paralysis of two homonymous vertical motors. However, good results were finally obtained after multiple procedures on both eyes. The affection was probably caused by damage to the roots of the nerves in the velum medullare. C. Zimmermann.

Jameson, P. C. **Entity of muscle recession. A short résumé of its technique and principles with new supplementary notes and illustrations.** Arch. of Ophth., 1939, v. 21, Feb., pp. 362-370.

The author discusses the technique of the operation, the instrumentation, suture material, and the tests necessary for proper computation and gradation in any given case. (Illustrations.)

J. Hewitt Judd.

Motolese, Francesco. **Bilateral paralysis of the external rectus muscle associated with papilledema from novocaine rachianesthesia.** Boll. d'Ocul., 1938, v. 17, Aug., pp. 629-634.

A woman of 34 years soon after an operation performed under spinal anesthesia became affected by headache and then by vomiting. A month later she developed diplopia due to paralysis of both external rectus muscles. The visual acuity was found to be markedly reduced, the visual fields contracted for form and color, and both discs affected by pronounced edema. The headache and paralysis disappeared after the third spinal puncture but the visual acuity and fields remained permanently damaged. The picture was one of serous meningitis. Another patient of forty years after a spinal anesthesia became

affected by headache and ten days later by paralysis of the left external rectus muscle. The symptoms spontaneously disappeared 2½ months after their appearance. A discussion of the etiology and mechanism of action of the syndrome closes the article. (Bibliography.) M. Lombardo.

Mutch, J. R. **Foville's syndrome—record of a case.** Brit. Jour. Ophth., 1939, v. 23, April, pp. 225-238.

A male, aged 56 years, had a pontine lesion with focal signs. The positive findings on examination revealed: paralysis and atrophy of muscles of the left side of the face, left internal strabismus, loss of conjugate movement of both eyes to the left, right ptosis, unequal pupils, horizontal nystagmus when looking to the right, slurring speech, sclerosis of retinal vessels, and unsteadiness of gait with a tendency to fall to the left. The blood supply to the pons is discussed, the author concluding that there was a thrombosis of a median branch of the basilar artery. (Illustrations, references.)

D. F. Harbridge.

Weekers, F. **A procedure for muscular advancement in high degrees of divergent strabismus.** Ophthalmologica, 1939, v. 96, Jan.-Feb., p. 210.

The author describes a method of advancement of the internal rectus which he recommends highly because the muscle is not apt to slip and because placing sutures through the sclera is avoided. The conjunctiva is incised at the limbus from the 12-o'clock to the 6-o'clock position. The internus is then undermined and a suture is passed through the muscle from below and out through the conjunctiva near its edge. The suture is tied and one end passed under a loop of silk suture which has been placed under the tendon of the externus without conjunctival incision. When the internus suture is knotted about the loop, the internus and conjunctiva are drawn completely over the cornea. After a week, the sutures and the portions of conjunctiva and muscle which overlie the cornea are removed. The remaining tissues quickly fall into normal position. Deviation of 40 degrees can be corrected with no limitation of movement resulting.

F. Herbert Haessler.

Weve, H. **A useful variant of Lancaster's stitch in muscle advancement.** Ophthalmologica, 1939, v. 96, Jan.-Feb., p. 217.

Weve finds Lancaster's stitch the most useful in muscle advancement, but notes that it has one drawback. The knotting of the suture, a most important step of the operation, is often difficult. Weve has modified the procedure as follows: He places the suture through the muscle as Lancaster does but does not, as a next step, place the same suture in the sclera. Instead, he carries a separate suture through the tendon and ties the muscle-suture ends to the ends of the second suture. The silk is buried and rarely removed.

F. Herbert Haessler.

5

CONJUNCTIVA

Allende, F. P. **Observations on varicose veins of the conjunctiva, corneal ulcer, corneal leucoma (tattooing), and astigmatism.** Arch. de Oft. de Buenos Aires, 1938, v. 13, Sept., p. 492.

A potpourri of clinical observations upon varicosity of conjunctival vessels, treatment of corneal ulcer by subconjunctival injections of methylene blue, tattooing of corneal scars, and the relative occurrence of astigmatism with or

against the rule in the young and aged in a small series of cases.

Edward P. Burch.

Applemans, M. **Parinaud's conjunctivitis caused by the virus of lymphogranulomatosis inguinalis.** Ophthalmologica, 1939, v. 96, March, p. 321.

The author discusses lymphogranulomatous lesions in general. He indicates that Parinaud's conjunctivitis is in many respects similar to lymphogranulomatosis inguinalis and may be caused by the same virus. He reports his findings in a patient in whom this was true as demonstrated by the intradermal reaction of Frei. The infection was a laboratory accident.

F. Herbert Haessler.

Arruga, H. **New technique for operating upon pterygium.** Ophthalmologica, 1939, v. 96, March, p. 333.

Arruga stains the conjunctiva of the upper quadrant with a 10- or 15-percent solution of gentian violet. This is important because in a later stage of the operation it becomes very difficult to distinguish the epithelial surface from the deeper one except for the stain. He then extirpates the entire pterygium, starting at the corneal tip and carrying the incision as far out as the caruncle. The conjunctiva is then undermined and a flap cut from the colored portion is brought down to cover the denuded area. It is held in its new position by sutures placed at the limbus above and at the free edge of the original lower margin of the pterygium.

F. Herbert Haessler.

Bietti, Giambattista. **Spectrographic investigations on the presence of metals in the conjunctiva.** Boll. d'Ocul., 1938, v. 17, Sept., pp. 729-737.

Qualitative and quantitative analyses were made on small pieces of normal and pathologic human conjunctiva, and on the conjunctiva of rabbits treated by instillations of collyria containing metal bases. This method can also be used to indicate the presence of medicinal substances introduced into the system by other ways, and can find useful applications in fields of legal medicine and ocular pathology. (Bibliography, 4 figures.)

M. Lombardo.

Borioni, Domenico. **Folliculin in the treatment of gonococcic conjunctivitis.** Boll. d'Ocul., 1938, v. 17, Sept., pp. 776-784.

The satisfactory use of folliculin by instillation and by mouth in ten newborn and a girl of eight years affected by gonococcic conjunctivitis is reported. The writer admits that folliculin cannot replace silver therapy (argyrol), but the hormone can be given internally to the debilitated new-born while the silver preparation is used locally. (Bibliography.) M. Lombardo.

Cavallacci, Giulio. **Gold therapy in trachoma.** Arch. di Ottal, 1938, v. 45, Nov.-Dec., p. 313.

The gold salt known as solganol B, suspended in oil, was used in the treatment of trachoma. On the basis of experiments previously done, this gold salt was found to diffuse easily into the globe and adnexa with very little toxic or general reaction. The experiments were carried out locally by instillation, and generally by intramuscular injection. Instillation therapy was used only in cases of early trachoma without corneal complications. A 2-percent solution of solganol B was used three times a day and increased up to 20 percent. The author concluded that the local treatment did not improve the trachomatous condition or consequent complications.

In intramuscular treatments, sol-

ganol B was used in doses of gr. 0.002 up to gr. 0.2. Two injections per week were given. In one group of cases a mydriatic was used and the solganol given intramuscularly; in another group of cases local therapy was given plus the solganol therapy. The author concluded that in those cases which were given only gold therapy by intramuscular injection, no appreciable benefit was obtained; but with local therapy plus intramuscular gold therapy, there appeared to be a better resolution of ocular complications, particularly in long-standing and rebellious cases. H. D. Scarney.

Cornet, Emmanuel. **Optical iridectomies in the trachomatous. Prevention of postoperative pannus.** Revue Internat. du Trachome, 1939, v. 16, Jan., p. 48. (See Section 7, Uveal tract, sympathetic disease, and aqueous humor.)

Czukrász, Ida. **Contribution to the local hyperthermic treatment of ophthalmoblennorrhea.** Klin. M. f. Augenh., 1939, v. 102, April, p. 512.

Six cases are reported in which warm irrigations promoted disappearance of the secretion and of the gonococci, abbreviated the healing process, and had a good influence on the corneal complications. C. Zimmermann.

Czukrász, Ida. **A case of primary lues in the superior fornix.** Brit. Jour. Ophth., 1939, v. 23, May, pp. 347-350.

A forty-year-old physician, into whose right eye a patient with mucous patches had coughed a month previously, developed swelling of the lids, edema and injection, and painful enlargement of the preauricular lymph glands. No local defect in the conjunctiva was found, but two weeks later the Wassermann was reported positive. Under antiluetic treatment, the condition healed completely without scarring. Apparently the spirochetes can penetrate the loose epithelium of the conjunctiva without lesions being present. D. F. Harbridge.

Kholina, A., and Chernobilskaja, P. **The conjunctival flora of the newborn, and its response to agents used for the prophylaxis of gonorrhea.** Viestnik Opht., 1939, v. 14, pt. 1, p. 54.

This laboratory investigation of the conjunctival flora of the newborn and the vaginal secretion of the mother indicates that the vaginal secretion infects the eyes of the fetus before birth. One-percent silver nitrate, the standard prophylactic agent against gonorrhea, in 50 percent of cases irritates the conjunctiva of the newborn. There is practically no difference in the effectiveness and irritating effect of silver nitrate and protargol. The investigation brings out the need for research for a bactericidal but non-irritating substance. Ray K. Daily.

Lehrfeld, L., and Miller, J. **Additional research on vernal conjunctivitis.** Arch. of Ophth., 1939, v. 21, April, pp. 639-646.

Heredity is an important factor in vernal conjunctivitis since 40 out of the 120 patients studied gave a family history of allergy. This is comparable with other forms of atopy. The similarity between vernal conjunctivitis and other atopic diseases is striking: there is a definite seasonal incidence, the age group and sex incidence correspond to those found in other atopic states, and a large proportion give positive intradermal and ophthalmic reactions to pollens and other antigens. Eosinophilia is present in the blood and in the ocular discharge. There is a specific local hypersensitiveness of the conjunctiva

without constitutional reactions. Epinephrine hydrochloride instilled locally gives temporary relief.

J. Hewitt Judd.

Luzsa, Andreas. **The treatment of trachoma with trachocid.** Klin. M. f. Augenh., 1939, v. 102, April, p. 507.

The enthusiastic report of Keppich and of Brecher and Lobel on the therapeutic value of trachocid in trachoma induced the author to try this form of treatment. His use of it on 25 patients was without the least success.

C. Zimmermann.

Marcus, I. M., and Katznelson, A. B. **Cytologic studies in phlyctenular (tuberculous-allergy) diseases.** Viestnik Opht., 1939, v. 14, pts. 2-3, p. 80.

A study of 200 cases leads to the following conclusions: Characteristic of the cytologic picture are a pronounced histiocytosis and a less-marked eosinophilia; these findings are most pronounced in cases with inflammatory conjunctival symptoms; and there is a parallelism between the acuteness of the inflammatory symptoms and the cytologic picture. The cytologic reaction takes place during allergic exacerbations. The experimental cytologic picture in rabbits is that of a pronounced eosinophilia and moderate monocyte-histiocytosis..

Ray K. Daily.

Neher, E. M. **A new method for transplanting pterygium.** Arch. of Ophth., 1939, v. 21, Jan., pp. 30-32; also Trans. Amer. Ophth. Soc., 1938, v. 36, p. 163.

The author states that transplantation of the entire pterygium beneath the upper bulbar conjunctiva has not previously been described. He portrays his own operative technique and points out the merits and advantages that it possesses over other operative methods. (Discussion.) J. Hewitt Judd.

Pŏstić, Svetozar. **The importance of the Weil-Félix reaction in trachoma and its bearing on the rickettsian etiology of trachoma.** Revue Internat. du Trachome, 1939, v. 16, Jan., p. 31. (See Amer. Jour. Ophth., 1939, v. 22, p. 217.)

Pŏstić, Svetozar. **Remarks on the address by Cuénod and Nataf. Bacteriologic and experimental investigations on the etiology of trachoma.** Klin. M. f. Augenh., 1939, v. 102, April, p. 506.

In 75 of 100 cases of trachoma Pŏstić found a positive Weil-Félix reaction if the trachomatous process was still florid. The serologic reactions of Weil-Félix were negative in rabbits which had been injected intraperitoneally with abraded trachomatous material. C. Zimmermann.

Puscariu, E., and Triandaf, E. **Trachoma contagion, especially in the adult.** Revue Internat. du Trachome, 1939, v. 16, Jan., p. 24.

Opinion varies widely between many authors with regard to the communicability of trachoma in the adult. In this study of trachoma in Rumania, 945 out of 1,861 cases were proved to be adult infection. Particularly significant was the finding of 293 new cases in the army.

J. Wesley McKinney.

Rachevskii, F. A. **Biochemical data in trachoma.** Viestnik Opht., 1939, v. 14, pt. 1, p. 110.

Studies on 24 trachoma and 24 control patients show no deviation from the normal in the calcium and potassium content, the dry residue of serum, the albumen globulin coefficient of serum, and the blood-sugar curve.

Ray K. Daily.

Radzichovskii, L. B. **Suction in the treatment of trachoma.** Viestnik Opht., 1939, v. 14, pt. 1, p. 112.

The author aspirates the trachoma follicles by means of a suction tube, and on the basis of his experience with 63 cases he considers this procedure less traumatizing than expression.

Ray K. Daily.

Richards, P., Forster, W. G., and Thygeson, P. **Treatment of trachoma with sulphanilamide.** Arch. of Ophth., 1939, v. 21, April, pp. 577-580.

The results of treatment of twelve Indian children, all showing active trachoma with follicular hypertrophy and pannus, are recorded and tabulated. All showed marked improvement and at the end of 4½ months the conjunctiva in each instance had become follicle-free and smooth. There was a disappearance of corneal infiltrates and an apparent arrest of corneal activity in all but one eye. Two untreated children used as controls showed no improvement during the period of observation but improved rapidly when sulphanilamide therapy was instituted. This treatment caused a disappearance of the epithelial cell inclusion bodies. J. Hewitt Judd.

Rosenzweig, M. G. **Transplantation of cadaver conjunctiva.** Viestnik Opht., 1939, v. 14, pts. 2-3, p. 26.

Nine case reports illustrate the usefulness of cadaver conjunctiva for plastic and therapeutic purposes. Twelve days was the longest period of preservation. Difference in blood type and sex between the host and donor is of no significance. Cadaver blood is a good medium for preservation of the conjunctiva. Ray K. Daily.

Rötth, A. de. **Common wart as an etiologic factor in certain cases of conjunctivitis and keratitis.** Arch. of Ophth., 1939, v. 21, March, pp. 409-420.

Ocular disease caused by the common wart of the eyelid was first described by the author six years ago (Amer. Jour. Ophth., 1933, v. 16, p. 1029). He now reports seven cases of unilateral conjunctivitis, mostly subacute, and three cases of keratitis which were observed in connection with warts of the eyelid. One case of bilateral conjunctivitis is reported in which warts were present on the lids of both eyes. The author considers the following features: virus of the wart as the etiologic factor because of the analogy to molluscum conjunctivitis, unilaterality, superficial involvement, resistance to the usual treatment, and quick recovery after the removal of the wart. It is suggested that any inclusion diseases of the skin may attack the eye. J. Hewitt Judd.

Spadavecchia, V. **Critical exposition of the present state of the etiology of trachoma with especial consideration of the Prowazek bodies and of the rickettsia.** Ann. di Ottal., 1939, v. 67, Jan., p. 1.

The author reviews the various theories and laboratory experiments that have been contributed up to the present time on the etiology of trachoma. No organism has been discovered that meets the scientific requirements as a causative agent, nor have those holding the theory that the disease is the product of a filtrable virus succeeded in producing an immunizing vaccine. The article has an extensive bibliography. Park Lewis.

Stocker, F. **A pigmented corneal line in pterygium.** Klin. M. f. Augenh., 1939, v. 102, March, p. 384.

Two men of 47 years affected with pterygium showed near the apex of the

pterygium under the epithelium in the clear cornea a firm line consisting of pigment dots. This line did not reach the limbus, and was at right angles to the less-refracting, flattened meridian. After operative removal of the pterygium the line disappeared. Vogt proved anatomically that the senile corneal line is caused by rupture of Bowman's membrane. That the line does not appear in all cases of pterygium is ascribed to the fact that flattening of the cornea occurs only in cases in which the pterygium encroaches upon the cornea with a wide head.

C. Zimmermann.

Suurküla, J. **Evaluation of bacteriologic findings in conjunctival inflammations.** Ophthalmologica, 1939, v. 97, April, p. 20.

Investigations of the author as well as those of others have shown that the bacterial flora of the normal conjunctiva does not differ from that of the inflamed conjunctiva. Microscopic study of smears made from exudate and from epithelial scrapings did not give sufficient information to make an etiologic diagnosis. This was determined with a greater degree of probability when biologic studies were made of organisms obtained by culture from the conjunctiva. F. Herbert Haessler.

Thygeson, Phillips. **Cultivation of trachomatous conjunctival epithelium in vitro.** Arch. of Ophth., 1939, v. 21, Feb., pp. 229-234.

Trachomatous conjunctival epithelium was found to proliferate in vitro almost as readily as normal conjunctival tissue, the histologic appearance differing in no way from that observed in cultures of normal epithelium. The trachoma virus failed to multiply or even to survive under conditions which enabled abundant growth of its normal host cells, evidence of its extreme fastidiousness in the matter of growth requirements. Since, in general, viruses require cells having an active metabolism for their multiplication, and since rickettsias grow best in cells which have become stabilized and in which utilization of oxygen has almost ceased, the relationship of the trachoma virus to the rickettsias may soon be known. The author feels that the proper growth conditions for the trachoma virus will ultimately be found.

J. Hewitt Judd.

Thygeson, Phillips. **Cultivation in vitro of human conjunctival and corneal epithelium.** Amer. Jour. Ophth., 1939, v. 22, June, pp. 649-654; also Trans. Amer. Ophth. Soc., 1938, v. 36, p. 199.

Trapesontzewa, C. **As to the "Rickettsia" of trachoma.** Revue Internat. du Trachome, 1939, v. 16, Jan., p. 40. (See Amer. Jour. Ophth., 1939, p. 218.)

6

CORNEA AND SCLERA

Allende, F. P. **Observations on varicose veins of the conjunctiva, corneal ulcer, corneal leucoma (tattooing), and astigmatism.** Arch. de Oft. de Buenos Aires, 1938, v. 13, Sept., p. 492. (See Section 5, Conjunctiva.)

Ballantyne, A. J. **Punctate and ring-shaped corneal degeneration.** Ophthalmologica, 1939, v. 96, March, p. 346.

A few months ago Kraupa (see Amer. Jour. Ophth., 1939, v. 22, p. 323) published an observation of this condition under the impression that it had not been previously described. Ballantyne points to several earlier references but states that the histology still requires elucidation.

F. Herbert Haessler.

Berardi, M., and Motolese, A. **Hereditary familial corneal dystrophy with relapsing dysepithelization.** Boll. d'Ocul., 1938, v. 17, Sept., pp. 711-728.

In a family of 26 members, nine of the fourteen who came under observation had corneal lesions. The corneae appeared to have a bluish-grey discoloration and numerous opacities of different shapes were seen. The opacities divided dichotomously from the center of the cornea to 1 mm. from the limbus, running under the epithelium or in the superficial layers of the stroma. They were thought to be nerve filaments. The entire picture was interpreted as a nervous dystrophy which provoked loss of epithelium. (Bibliography, 4 figures.) M. Lombardo.

Biernacka-Biesiekierska, Jadwiga. **Studies on the form of the cornea.** Klinika Oczna, 1938, v. 16, pt. 6, p. 732.

In this fourth article on the structure of the cornea the author believes to have demonstrated a close relation between asymmetry in prominence of the eyeballs, refraction, the diameter of the eyeballs, and corneal radius. Tabluated data show the frequency of asymmetry in the two eyes relative to these factors. The conclusions are that hyperopic eyeballs have a tendency towards symmetry, while myopia tends to be associated with asymmetry in the factors investigated. Ray K. Daily.

Bochever, E. M. **Intrascleral cysts.** Viestnik Opht., 1939, v. 14, pt. 4, p. 66.

A report of two traumatic cases. In one the intrascleral cyst developed in a postoperative cicatrix, the primary operation having been performed for the excision of a congenital iris cyst. The walls of the excised cyst were lined with numerous layers of corneal epithelial cells. The other case developed subsequent to a perforating ocular injury; because the eye was blind it was enucleated. The cyst was lined with conjunctival epithelium, stratified in some places, and consisting of one or two layers in others. Ray K. Daily.

Cornet, Emmanuel, **Trachomatous corneal vascularization. Its clinical value.** Revue Internat. du Trachome, 1939, v. 16, Jan., p. 1.

The author describes the different forms of corneal vascularization which may occur in the course of trachoma. He considers pannus to be a reparative process in response to loss or excess of tissue. Interstitial vascularization may be due to trachoma itself or to an associated syphilitic or tuberculous process. Clinical forms are cited.

J. Wesley McKinney.

Dalsgaard-Nielsen, Esther. **On the acuity of vision and the causes of impairment of vision in patients with past syphilitic interstitial keratitis.** Acta Ophth., 1939, v. 17, pt. 1, p. 43.

A review of the literature and a very detailed analysis of the author's own material which consisted of 214 eyes. The visual acuity was 6/6 to 6/18 in 75 percent, 6/24 to 6/60 in 11 percent, less than 6/60 in 8 percent, and blindness in 6 percent. In addition to the corneal sequelae of parenchymatous keratitis, factors in visual impairment were iridocyclitis, glaucoma, cataract, and choroiditis. Ray K. Daily.

Dalsgaard-Nielsen, Esther. **On the recurrence of syphilitic interstitial keratitis.** Acta Ophth., 1939, v. 17, pt. 1, p. 38.

On the reëxamination of 173 patients the author failed to find a true recurrence of keratitis. She believes that most reported recurrences are errors in diagnosis and she cites two cases of

recurrent iridocyclitis which but for a careful study of the corneal precipitates might have been diagnosed as a recurrence of parenchymatous keratitis.

Ray K. Daily.

Dalsgaard-Nielsen, E., and Osterberg, G. **Ulcus rodens Mooren.** Acta Ophth., 1939, v. 17, pt. 1, p. 28.

A review of the literature and a report of two cases. In one patient, a woman 52 years old, the involvement was unilateral and ended in enucleation. In the other, a woman 57 years old, the disease was bilateral. The microscopic sections of the enucleated eye revealed profound vascular changes in and behind the ulcer, as well as on the opposite side, and indicate that the corneal disease is secondary to pericorneal vascular disturbances. (Illustrations.)

Ray K. Daily.

Davidson, M. **Occupational keratitides and corneal dystrophies.** Arch. of Ophth., 1939, v. 21, April, pp. 673-683.

Occupational superficial punctate keratitis and dystrophy are often diagnosed as subacute or chronic conjunctivitis and as band-shaped keratitis, and the true nature of the conditions is overlooked without the use of the slit-lamp. Three types of this form of keratitis may be recognized. The first is an acute or subacute occupational superficial punctate keratitis, apparently due to particulate matter in spraying processes which clings to the corneal epithelium, rather than to gases. The second is a chronic occupational superficial punctate keratitis verging on a dystrophy and apparently due to hard and sharp spicules penetrating the cornea, such as silica or metals. This type is more important because of the hypesthesia, but is not common and is seen only among the older workers, being principally due to exposures in the presafety era. The third type is an occupational band-shaped keratitis seen in the form of a post-traumatic lime band. Medicolegally, an interval of from one to five days is to be considered a requisite for a causal relation between a corneal injury and a herpetic corneal disease. The problem of prevention of occupational keratitides and dystrophies is essentially one of safety engineering. J. Hewitt Judd.

Duc, Camillo. **Avitaminosis A.** Rassegna Ital. d'Ottal., 1938, v. 7, Nov.-Dec., p. 791.

Duc reviews the literature on vitamin A and the disturbances caused by its deficiency. He reports two cases occurring in improperly-fed babies of two months. In the first case there was bilateral keratomalacia with necrosis of one cornea. The second baby also presented keratomalacia but died on the eleventh day of treatment. (One figure.) Eugene M. Blake.

Feigenbaum, Aryeh. **Note on epidemic superficial punctate keratitis in Palestine.** Revue Internat. du Trachome, 1939, v. 16, Jan., p. 18.

The author reports eight cases of this disease, an affection which occurs in many tropical and subtropical countries particularly during the rainy season. It is a virus disease as shown by inoculations of corneal scrapings. Three of the cases were thought to be acute trachoma.

J. Wesley McKinney.

Grancini, Enrico. **An exceptional case of severe ulcus rodens corneae in a young subject which manifested itself consecutively and symmetrically also in the other eye.** Boll. d'Ocul., 1938, v. 17, Aug., pp. 645-662.

A young man of twenty years, after being struck in the left eye by the tail of an ox, developed a corneal ulcer which by its course and appearance was diagnosed as a rodent ulcer. It resisted the usual forms of treatment, and healed only after a Kuhnt keratoconjunctival plastic was performed. A few months later the patient, without any evident cause, developed the same type of ulcer on the right cornea. Its progress was stopped after the same plastic was performed. A good amount of vision was saved in this eye and it was later improved by the use of subconjunctival injections of a hypertonic solution of NaCl. Pterygium-like growths were trimmed off. The writer emphasizes the satisfactory and effective result obtained by the surgical procedure used in these cases, and although microscopic and cultural researches revealed the presence of a bacterium identified as a streptothrix, he concludes that such a lesion has to be considered of neurotrophic rather than of bacteriologic origin. (Bibliography.)

M. Lombardo.

Graves, Basil. **Bilateral mesial superficial "deficiency" of the sclera (scleral plaques).** Brit. Jour. Ophth., 1939, v. 23, March, pp. 191-204.

This article was written prior to the appearance of one by Culler on the same subject (Amer. Jour. Ophth., 1939, v. 22, p. 457), and is now published as originally written, but with the insertion of comments on Culler's article. Congenital aspects of the condition are mentioned, but the bulk of the article concerns corneal changes found in association with the scleral condition. Certain highly refractile droplets in the substance of the cornea adjacent to the scleral plaque are interpreted as being degenerative products, and suggest that the associated scleral defect may represent a hyaline degeneration. (Illustrations.)

D. F. Harbridge.

Gundersen, Trygve. **Vascular obliteration for various types of keratitis; its significance regarding nutrition of corneal epithelium.** Arch. of Ophth., 1939, v. 21, Jan., pp. 76-105; also Trans. Sec. on Ophth., Amer. Med. Assoc., 1938, 89th mtg., p. 94.

The effect of interrupting blood vessels at the limbus was observed in 36 cases including eight different groups of various types of keratitis associated with vascularization of the cornea. The cases are reported in detail, the areas cauterized and the effect on the blood vessels being shown by means of diagrams. Considering the chronic nature of the disease in each case, the results were good and leave no doubt that peritomy is of great value in certain corneal conditions. The assumption that the newly formed blood vessels cause and maintain the reactivation of the lesions explains the results obtained in these cases. Corneal blood vessels may cause not only opacification, but necrosis and an actual increase in the amount of corneal infiltration. Obliteration of the pericorneal blood vessels is particularly valuable in metaherpetic ulcers since they are probably due to a nutritional disturbance or to some noxious substance brought to the cornea by the abnormal blood vessels. The so-called wandering phlyctenule of the cornea is not always tuberculous in origin as a similar condition may result from herpes corneae and other causes. Complete peritomy does not cause any visible disturbance in the corneal epithelium. Almost all of the pericorneal blood supply can be excluded without harmful effect. In view of this fact and other experimental evidence, and since

the tears are rich in sugar and nitrogenous substance, it is probable that the epithelium derives its nutrients chiefly from tears and utilizes oxygen directly from the surrounding air. (Discussion.)

J. Hewitt Judd.

Kamenetzkaja, Z. **The effect of the age of the donor on the fate of the transplant.** Viestnik Opht., 1939, v. 16, pt. 4, p. 71.

A report of five cases in which the preserved cornea of the cadaver was used with very good results. The age of the donors varied from fifty to seventy years. Ray K. Daily.

Lagomarsino, Alice. **Bee poison in the treatment of trachoma.** Ann. di Ottal., 1939, v. 67, Feb., p. 143.

The absence of exact knowledge of the pathogenesis of trachoma has warranted the employment of empirical methods of treatment. The poison of the honey bee has been used for various purposes. The author describes the method of obtaining the poison from the bee, its physiologic action and biology, and reports eighteen cases of trachoma treated by this method. From the first instillation improvement was noted, with healing of the ulcer and regression of the pannus. The eyes were tolerant to treatment. (Bibliography.) Park Lewis.

Löscher, H. **Treatment of acne rosacea of the cornea.** Klin. M. f. Augenh., 1939, v. 102, March, p. 392.

Four cases are reported cured by subcutaneous 1-c.c. injections of cortidyn (an extract of adrenal cortex) every two days, and simultaneous oral doses of two tablets daily.

C. Zimmermann.

McKee, S. H. **Treatment of serpiginous ulcer of the cornea with methyl salicylate.** Arch. of Ophth., 1939, v. 21, Jan., pp. 121-123.

This treatment, which is used empirically, has proved very satisfactory in certain cases of serpiginous ulcers. It avoids the dense scars produced by actual cautery. According to the author's method, after instillation of a local anesthetic, the ulcerated area is thoroughly dried and the oil rubbed well into the ulcer with a round-ended wood applicator, the surrounding area being kept dry. After two or three minutes the eye is bandaged, and the patient put to bed. Five typical cases are reported in detail to show the variation in response. J. Hewitt Judd.

Mikaelian, P. X., and Privalskii, E. I. **Small-pox immunity of the cornea in stimulation of the upper cervical sympathetic ganglion.** Viestnik Opht., 1939, v. 14, pt. 1, p. 39.

The objective of this laboratory investigation was the demonstration of the relation of small-pox immunity to the vegetative nervous system. The protocols of the experiments showed a greater immunity in rabbits in which the superior cervical ganglion had been traumatized fifteen days previously to the corneal vaccination.

Ray K. Daily.

Mitzkevich, L. D. **A complication in subconjunctival implantation of auricular cartilage for trachomatous pannus.** Viestnik Opht., 1939, v. 14, pt. 1, p. 118.

Six weeks after this operation the patient returned with an atheromatous cyst. The author cautions against inclusion of skin in the cartilage transplant. Ray K. Daily.

Oreste, Alfredo. **Fascicular keratitis.** Boll. d'Ocul., 1938, v. 17, July, pp. 593-595.

Darier has called guaiacol a true specific for ocular tuberculosis. For fascicular keratitis the writer incorporates two drops of synthetic guaiacol in ten grams of 1 or 2-percent yellow oxide of mercury salve. The application of the salve two or three times a day in the conjunctival sac with the usual massage is followed by a beneficial analgesia, and in a few days all the irritative symptoms are decreased, the progressive margin of the ulcer is stopped, and the blood vessels disappear. Subconjunctival injection of a few drops of 2-percent guaiacol is suggested in severe cases. M. Lombardo.

Rötth, A. de. **Common wart as an etiologic factor in certain cases of conjunctivitis and keratitis.** Arch. of Ophth., 1939, v. 21, March, pp. 409-420. (See Section 5, Conjunctiva.)

Schmidt, Jenö. **Technique of keratoplasty.** Klin. M. f. Augenh., 1939, v. 102, March, p. 315.

Schmidt adopted the technique devised by Löhlein. Two causes, beside opacities of the transplant, are responsible for failures: postoperative increase of tension, and the formation of a retrocorneal membrane from blood, fibrin, and pieces of tissue lost during operation behind the transplant. In the reported case a retrocorneal membrane developed, discission of which would probably have improved vision.

C. Zimmermann.

Schwitalla, Helmut. **An epidemic of keratoconjunctivitis nummularis (Dimmer).** Klin. M. f. Augenh., 1939, v. 102 April, p. 491.

From September to December Schwitalla observed 129 cases all of which grew gradually worse. The typical course consisted of formation of epithelial opacities which developed into larger discs, indistinctly outlined, and lying in the anterior parenchyma of the cornea. They at no time became ulcerated. Vision was reduced to not more than one-third of normal. Of the 129 cases, 106 were unilateral; 23 were bilateral, but in the beginning all were unilateral, the second eye becoming affected after a few days. The etiology is not known, and the disease takes a more or less undisturbed course.

C. Zimmermann.

Segaller-Miron, M. **Diathermy coagulation in the treatment of trachomatous pannus.** Ann. d'Ocul., 1939, v. 176, March, pp. 204-212.

The author reports good results in treating trachomatous pannus by diathermy coagulation. There was no damage to the corneal tissue and no undue reaction in the iris or ciliary body. Although there were recurrences in some cases, this method seems superior to the usual surgical approach. Nine cases are reported in detail.

John M. McLean.

Shershevskaja, O. I. **Remarks on the technique of corneal transplantation.** Viestnik Opht., 1939, v. 14, pt. 1, p. 77.

A description of sutures for fixation of the conjunctival flap covering the transplant. (Illustrations.)

Ray K. Daily.

Sugita, Y. **Further observations on the character of the disc or ring-formed corneal opacities in disciform and other forms of keratitis.** Graefe's Arch., 1939, v. 140, pt. 1, pp. 141-148.

When strong acid such as sulphuric, nitric, or hydrochloric was rubbed into a wound 1 mm. long in the central part of the corneas of enucleated cattle eyes, disc-shaped corneal opacity similar to that seen in human disciform keratitis always resulted. This experiment in

the enucleated eye would indicate that the disciform keratitis in man may be concerned with cell function without any participation by cellular infiltration. The disc-shaped opacity in the cornea of the enucleated eye, as also the clinical picture of disciform keratitis, may be due to the diffusion of the cleavage products of albumen and other substances to form a ring of precipitation of stromal albumen. Disciform keratitis in the human may therefore be primarily produced by a physicochemical process with secondary wandering in of round cells. In cases where the corneas thus experimented upon were fixed, no opacity remained, proving that the opacity present before fixation must belong to physicochemical factors. H. D. Lamb.

Suurküla, J. **Is rodent ulcer of the cornea to be attributed to a deficiency of vitamin B_1?** Klin. M. f. Augenh., 1939, v. 102, April, p. 500.

Improvement of rodent ulcer in a woman of 49 years following thirteen intragluteal injections of betaxin seemed to indicate that rodent ulcer may be due to a trophic disturbance developing from degenerative changes in the corneal nerves secondary to deficiency of vitamin B_1.

C. Zimmermann.

Theodore, F. H. **Congenital type of endothelial dystrophy.** Arch. of Ophth., 1939, v. 21, April, pp. 626-638.

Three cases of endothelial dystrophy occurring in a young woman of eighteen years, her father, and her grandmother are described. The condition in these cases was apparently of congenital origin. A review of the literature reveals that some authors consider the condition to be congenital, while the great majority believe it to be a senile degenerative change. On the basis of evidence of some apparent differences noted in the two types, it is suggested that endothelial dystrophy be considered as having two forms, one congenital and the other senile.

J. Hewitt Judd.

Thiel, R. **Treatment of acne rosacea with extract of the cortex of adrenal glands.** Klin. M. f. Augenh., 1939, v. 102, March, p. 394.

Thiel had favorable results in ten cases (of which two are reported in detail) with injections of a preparation of extract from the cortex of the adrenal glands. No deleterious action was observed. C. Zimmermann.

Thygeson, Phillips. **Cultivation in vitro of human conjunctival and corneal epithelium.** Amer. Jour. Ophth., 1939, v. 22, June, pp. 649-654; also Trans. Amer. Ophth. Soc., 1938, v. 36, p. 199.

Tikhomirov, P. E. **The effect of carotin on infected and noninfected corneal wounds.** Viestnik Opht., 1939, v. 14, pt. 4, p. 55.

A laboratory study on rabbits showing that locally carotin hastens healing of noninfected wounds, but has no effect on infected wounds.

Ray K. Daily.

Tooker, C. W. **Metastatic septic endophthalmitis with ring abscess of the cornea.** Amer. Jour. Ophth., 1939, v. 22, May, pp. 526-535; also Trans. Amer. Ophth. Soc., 1938, v. 36, p. 77.

Wasserman, I. A. **Transplantation of cadaver cornea.** Viestnik Opht., 1939, v. 14, pts. 2-3, p. 10.

The conclusions are that cadaver cornea is the most suitable transplantation material. Transparent transplants were obtained in 58 percent of the cases,

while in transplants from the living the percentage was between 20 and 28. Transparent transplants were obtained from cornea preserved for from one to three days; in two cases the cornea was kept 8½ days. In cadaver corneal transplants the blood vessels enter in fewer numbers and become obliterated more rapidly than in transplants from the living. Ray K. Daily.

Zur Nedden. **Keratitis superficialis punctata.** Klin. M. f. Augenh., 1939, v. 102, April, p. 487.

Supplementing his previous article on an epidemic of superficial punctate keratitis (Amer. Jour. Ophth., 1939, v. 22, Feb., p. 223), the author has now observed 200 cases altogether. Only adults are affected. The etiologic factor may be any mechanical, thermal, or chemical irritation of the conjunctiva. It is suggested that the infection is by a still unknown virus. Some success was obtained by the use of a solution of iodine 0.1, iodide of potash 1.00, and water 100 in healing serpent ulcers not larger than 2 mm.

C. Zimmermann.

7

UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Antoniotti, Filippo. **The behavior of the pupil in cases of chronic appendicitis.** Rassegna Ital. d'Ottal., 1938, v. 7, Nov.-Dec., p. 762.

Antoniotti discusses the maladies outside the eye which may cause pupillary inequality, and then relates the results of his observations in 100 cases of chronic appendicitis. He states that dilatation of the right pupil is a precocious sign of chronic inflammation of the appendix and is valuable in differentiating diseases in the iliac fossa. The sign was positive in 80 percent of his cases. The test should be made in a moderately diffuse light.

Eugene M. Blake.

Bertoldi, Maria. **Heterochromia iridis, cyclitis, and cataract.** Rassegna Ital. d'Ottal., 1938, v. 7, Nov.-Dec., p. 738.

Bertoldi presents a very good review of our knowledge of heterochromia iridis and then describes such a case occurring in a man of 29 years. There had always been a fairly marked difference in the color of the two irides and later cyclitis and cataract formation appeared. The author postulates a congenital defect of the mesodermal pigment layer of one eye and a concomitant slight asymmetry of sympathetic nervous control. The development of a mild pulmonary tuberculosis, proved by X ray and skin reaction, was enough to incite the cyclitis and secondary cataract. Intraocular tension was normal. (One figure.) Eugene M. Blake.

Cohen, Martin. **Diseases of the choroid.** Arch. of Ophth., 1939, v. 21, March, pp. 522-526.

This review includes a brief summary of the anatomic structure and function of the choroid. Acute choroiditis is usually the result of local trauma or of a metastatic focus. Chronic choroiditis is usually the result of an acute choroiditis, although the condition may be due to various systemic diseases of a chronic nature, such as syphilis, tuberculosis, diabetes, and blood dyscrasias. Myopic changes and tumors are also briefly discussed.

J. Hewitt Judd.

Cornet, Emmanuel. **Optical iridectomies in the trachomatous. Prevention of postoperative pannus.** Revue Internat. du Trachome, 1939, v. 16, Jan., p. 48.

Reference is made to the corneal vascularization which often occurs after trauma in trachoma. This can be a particularly discouraging and unforeseeable complication in the only clear area following an optical iridectomy. In an attempt to avoid such vascularization the author routinely injects mercury cyanide subconjunctivally. J. Wesley McKinney.

Ellett, E. C. **(a) Leiomyoma and (b) hematoma of the iris.** Arch. of Ophth., 1939, v. 21, March, pp. 497-504; also Trans. Amer. Ophth. Soc., 1938, v. 36, p. 98. (See Section 15, Tumors.)

Gasteiger, H. **An operation for iridodialysis with remarks on a peculiar origin of this condition.** Klin. M. f. Augenh., 1939, v. 102, April, p. 537.

During an extracapsular extraction of cataract in a woman of 76 years the iris adhered to the lens and was pulled out. There were no synechiae and the iris had not been grasped by the forceps. The iris was then detached from the lens and cut in the form of a total iridectomy. Sixteen days later a conjunctival flap was prepared and two incisions with a lance-shaped knife were made at the limbus; the iris was drawn into the wound at both places and the conjunctiva sewed. A week later the iris was drawn into a new incision and there fixed with good result. The case shows that extensive dialyses can be healed by operation.

C. Zimmermann.

Hallermann, Wilhelm. **Operative treatment of tuberculous iridocyclitis.** Klin. M. f. Augenh., 1939, v. 102, March, p. 318.

Observations on the large number of patients at Hohenschwand (1,350) gave ample opportunity for evaluating results of iridectomy in tuberculous iridocyclitis, which proved to be very poor. The results of transfixion as devised by E. Fuchs were very satisfactory, as shown in eighteen recent cases. It is necessary that the fibers of the iris be severed at right angles to their course. C. Zimmermann.

Heath, Christopher. **Solitary retinochoroiditis with reference to retinochoroiditis juxtapapillaris, Jensen.** Brit. Jour. Ophth., 1939, v. 23, May, pp. 289-330.

The author considers that the subject under discussion has had both inadequate and inaccurate notice in the literature. Since the disease is not a rare one, it is felt that a review of the literature and an investigation of numerous cases would assist in clarifying present views. Twenty-four cases (ten male and fourteen female) are summarized as to findings under the following headings: type of patient, general health, tests, incidence, macular involvement, papillary changes, keratitic precipitates, vitreous changes, and pain. The patients were of a class in which a high incidence of tuberculosis would not ordinarily be expected. With four exceptions, all were engaged in skilled trades. Various types of visual-field defects are discussed, and the apparently high incidence of the disease in childhood is indicated. (Figures, bibliography.)

D. F. Harbridge.

Hodgson, T. H. **Studies on the aqueous humor in normal and glaucomatous eyes.** Trans. Ophth. Soc. United Kingdom, 1938, v. 58, pt. 1, p. 87.

Benham, Davson, and Duke-Elder stated in a previous communication (Amer. Jour. Ophth., 1938, v. 21, p. 704) that the osmotic pressure of serum

was greater than that of aqueous humor by an amount compatible with the formation of the latter by dialysis. As a result of further experiments, performed by Hodgson in collaboration with Benham and Duke-Elder, Hodgson now revises the above statement. The experimental work was undertaken to determine whether the fact that animal experiments had been done under general anesthesia had any bearing on the results. Dogs were trained to permit withdrawal of aqueous humor under local anesthesia, and it was found that the molar concentration of the aqueous was higher than that of the blood. Under ether anesthesia the osmotic pressure of the blood increased by an amount sufficient to reverse this relationship. These findings lead the authors to believe that the aqueous is not a dialysate. Beulah Cushman.

Kaminskaja-Pavlova, Z. A. **The relation between intraocular tension and pupillary reaction to pain.** Viestnik Opht., 1939, v. 14, pt. 4, p. 29. (See Section 8, Glaucoma and ocular tension.)

Muncaster, S. B., and Allen, H. E. **Bilateral uveitis and retinal periarteritis as a focal reaction to the tuberculin test.** Arch. of Ophth., 1939, v. 21, March, pp. 509-511.

A young woman aged 31 years was given 0.00002 mg. of purified protein derivative (Mulford). There was no reaction after 48 hours when another injection of 0.005 mg. was given. After four hours both the first and the second test areas became inflamed, and ten days later both eyes were involved with a marked uveitis which gradually subsided. The corrected vision returned to normal after three months but there were remnants of the retinal exudate along the larger arteries.

J. Hewitt Judd.

Samoilov, A. T., and Asarova, H. C. **An attempt at a clinical classification of tuberculous choroiditis.** Viestnik Opht., 1939, v. 14, pt. 4, p. 33.

The author classifies tuberculous choroiditis as exudative and hemorrhagic, each with a characteristic fundus picture, a characteristic focal reaction to tuberculin, and a different clinical course. (Illustrations.)

Ray K. Daily.

Walsh, F. B. **Ocular importance of sarcoid; its relation to uveoparotid fever.** Arch. of Ophth., 1939, v. 21, March, pp. 421-438.

That uveoparotid fever and sarcoid are closely related diseases with protean ocular manifestations is indicated by a clinical and histologic study of the six cases summarized in this paper. The frequent involvement of ocular tissue, which may be manifested at any time during the course of the disease, makes this symptom complex of particular interest to the ophthalmologist. The cause of these closely allied conditions is not known but it is thought to be tuberculosis. (Photomicrographs, photographs, fundus drawings, field charts.) J. Hewitt Judd.

Wiegmann, F. **A case of unilateral spasm of the intrinsic ocular muscles.** Klin. M. f. Augenh., 1939, v. 102. March, p. 391.

A girl of 22 years presented a unilateral spasm of the intrinsic ocular muscles for several days. The condition disappeared after instillations of scopolamine. It was attributed to a disturbance in the ciliary ganglion.

C. Zimmermann.

NEWS ITEMS

Edited by Dr. H. Rommel Hildreth

640 S. Kingshighway, Saint Louis

News items should reach the Editor by the twelfth of the month

Deaths

Dr. Frank Embery, Philadelphia, died March 17, 1939, aged 72 years.

Dr. Frederic Gilbert Ritchie, Queens Village, New York, died March 15, 1939, aged 78 years.

Miscellaneous

American Board of Ophthalmology. Written examination: August 5th, April 6th. Formal application must be received before July 1st for the August examination and before January 1st for the April examination. Oral: Chicago, October 7th; New York City, June 10th. Secretary, Dr. John Green, 6830 Waterman Avenue, Saint Louis, Missouri.

The Advisory Committee on Medicine and Public Health of the New York World's Fair, (members of the Executive Committee) of which are Dr. Louis I. Dublin and Dr. Victor Heiser, appointed a Committee on the Conservation of Vision. Dr. John M. Wheeler was selected as chairman. Upon his death, Dr. Daniel B. Kirby was asked to assume his duties for the organization of the exhibit. The members of the committee are Dr. Conrad Berens; Mr. Lewis H. Carris, National Society for the Prevention of Blindness; Mr. Homer N. Calver, Director of Medical Exhibits, New York World's Fair; Dr. John Evans; Dr. M. E. Frampton, principal, New York Institute for the Education of the Blind; Dr. Bruno Gebhard, technical consultant; Dr. LeGrand Hardy; Miss Grace S. Harper, New York State Commission for the Blind; Mr. M. Julian; Miss Eleanor Mumford, Associate for Nursing Activities; Dr. Webb W. Weeks. The expenses of the exhibit are borne by the sponsor, The New York Institute for the Education of the Blind. The principal of the Institute, Dr. M. E. Frampton, has a broad view of the purposes of the exhibit. He has cooperated to the utmost to portray The Eye in Health and Disease in a graphic way to the lay public who will visit the Hall of Medicine in which the exhibit is housed at the World's Fair.

The origin and development of the eye, its anatomy, physiology, and pathology are portrayed in beautiful, artistic transparencies in color. Twelve illuminated panels with 6 to 10 pictures each, tell the story. The presence of the blind students from the New York Institute brings home in a vivid and striking way the necessity for the program of the prevention of blindness. The members of the committee held numerous meetings and devoted much time individually to the selection of material and to the elaboration of new methods of presentation of a technical subject to a lay public in understandable terms. That success has been achieved is to be judged by the great interest and attendance.

The subjects which are shown are embryology, anatomy, optics, the effect of various diseases and poisons, the results of accidents and their prevention, the effect of inflammation and infections of the eye and general system and their prevention and treatment, cataract, glaucoma, and strabismus.

Coöperating in the production of the transparencies were: The American Board of Ophthalmology, The Eye Surgery Fund, The Institute of Ophthalmology, which contributed part of the art material of G. Bethke, M. Quinlin, and A. Marfaing, The Department of Ophthalmology of The State University of Iowa, The National Society for the Prevention of Blindness, The New York State Commission for the Blind, The Ophthalmology Fund, and the Lighthouse.

The New York Institute for the Education of the Blind through Dr. M. E. Frampton and Mr. Paul Mitchell adopted the purpose of educating the public regarding the normalcy of blind people and the manner of their adjustments to blindness. The spoken word is exemplified by vibration aids in the education of the deaf-blind and symbolized through radio to show vocational possibilities for the sightless. Emphasis is placed on the written word by the use of the Braille machine to convey information from the sighted to the blind and the use of the typewriter to convey it from the blind to the sighted. The progress of the blind in literature, science, mathematics, and in the arts and crafts is exemplified by blind students who exhibit their attainments in brief working periods at the Fair. Along the top of the main wall is the motto "And I Shall Lead The Blind By A Way They Knew Not" with a transcription in enlarged Braille just below the motto, each Braille letter directly below its corresponding printed letter.

The actual presence of the blind in connection with their problems of education and vocational nature must emphasize the need for the prevention of blindness and make for a better understanding of the blind. It will make easier the problem of the eye physician and

those who are associated with him in the care of the eyes of the public.

Societies

The Advisory Council on Medical Education was created on June 24, 1939, at a meeting in Chicago by 11 national organizations concerned with the training of physicians to meet the present-day needs of medical care for the country. The need for some central representative agency has long been recognized as necessary to make medical training more effective than it has been in its service to the public.

Dr. Willard C. Rappleye, Dean of the Faculty of Medicine of Columbia University, who was elected president, stated that the purpose of the Advisory Council is to correlate the efforts of the universities, medical schools, hospitals, licensing bodies, public health associations, and boards of specialists.

"This organization brings together for the first time the various national bodies dealing with all phases of the training and licensing of physicians beginning with his preparatory college work and including medical education, hospital internship, residency, licensure, and graduate training for specialization. Coöperation and coördination are to be substituted for present overlapping and competing functions of existing agencies."

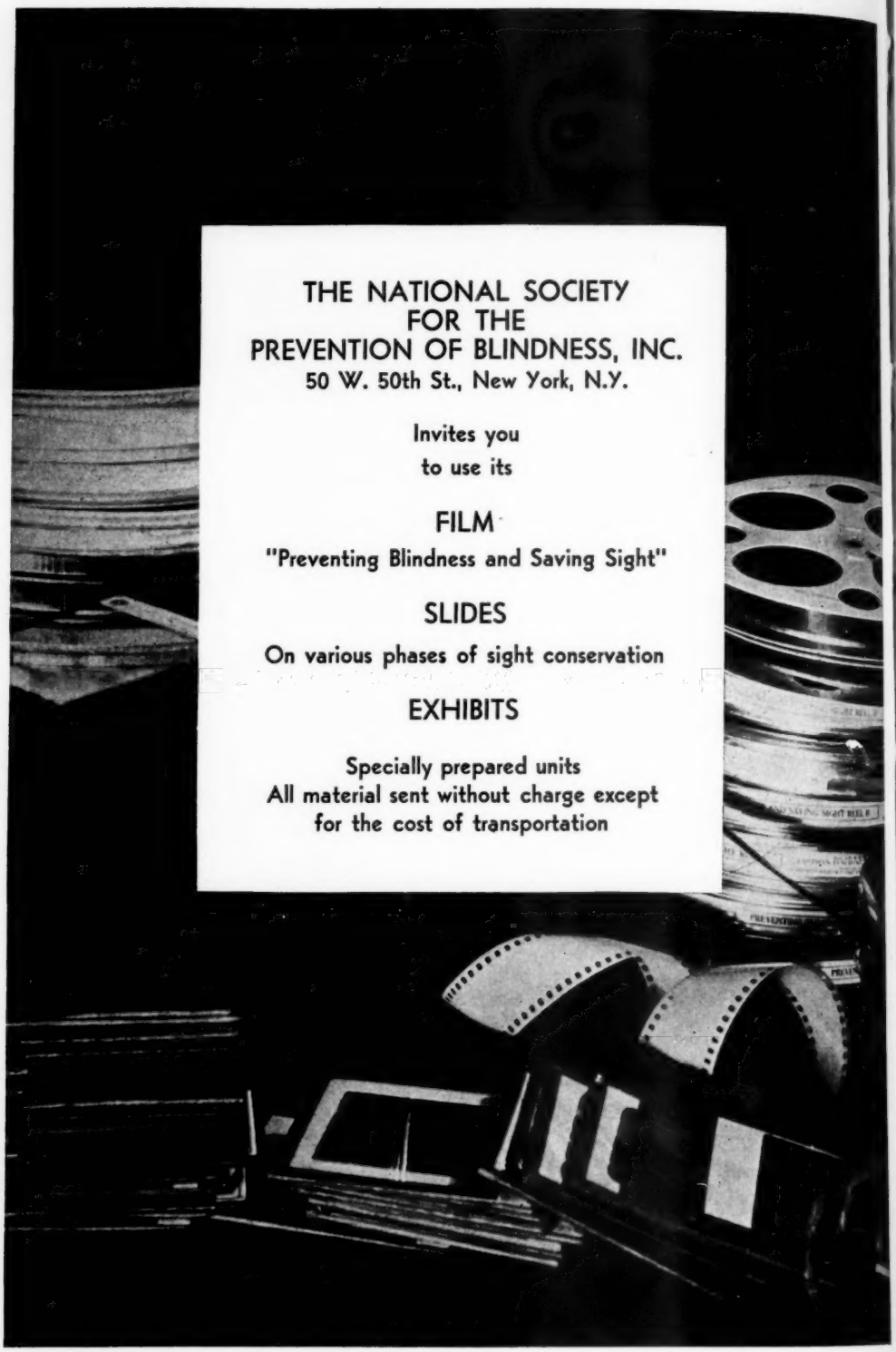
The organizations represented on the Advisory Council on Medical Education are: Association of American Medical Colleges, American Hospital Association, Catholic Hospital Association, Federation of State Medical Boards of the U.S.A., Advisory Board for Medical Specialties, National Board of Medical Examiners, American College of Physicians, American College of Surgeons, Association of American Universities, American Association for the Advancement of Science, Division of Medical Science, and the American Public Health Association. Two new organizations were recently elected to membership: American Protestant Hospital Association and the Association of American Colleges.

Among the important problems considered by the Council at its meeting were those of proper educational standards of the hospital internship, adequate training for the specialist, sound programs for the continued education of physicians in practice, modifications in college preparation for medical studies, the simplification of the procedure for licensure in the 48 separate states, and the status of training of graduates of foreign medical schools. Special committees of the Council were appointed to study these various questions.

The following are the officers: Dr. Willard C. Rappleye, Dean of the Faculty of Medicine of Columbia University, president; Dr. Maurice H. Rees, Dean of the School of Medicine of the University of Colorado, vice-president; Dr. Robin C. Buerki, Director of Study of the Commission on Graduate Medical Education, secretary-treasurer. The Executive Committee consists of the officers and the following: Dr. Anton J. Carlson, Professor of Physiology of the University of Chicago; Dr. Harold Rypins, Secretary of the New York State Board of Medical Examiners; Dr. Hugh J. Morgan, Professor of Medicine of Vanderbilt University; Dr. Arthur W. Allen, surgeon, Boston.

Personals

Dr. Arthur Bedell was the guest of the Canadian Medical Association at their annual meeting in Montreal the week of June 19th. He addressed the general meeting on "Retinal changes in arterial hypertension" and also took part in discussion in the special section.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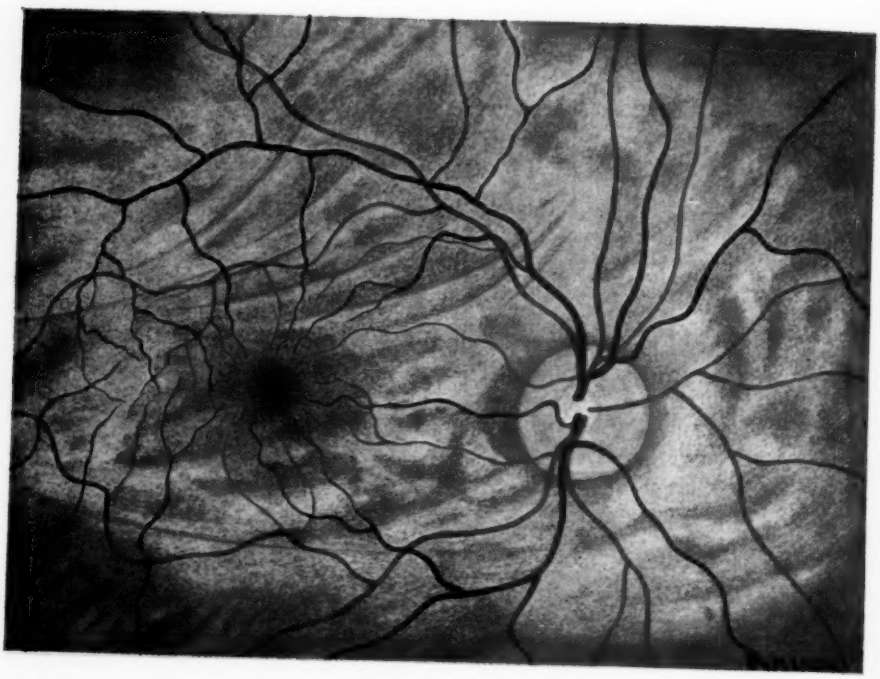

FIG. 1 (KLIEN). FUNDUS IN OGUCHI'S DISEASE.

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